South Holland Internal
Drainage Board
Pierpoint House
28 Horsley's Fields
KING'S LYNN
Norfolk PE30 5DD

01553 819600
Planning@wlma.org.uk

West Nurseries LTD
20 Mallard Road
Low Fulney
Spalding
PE12 6ND

Our Ref: 23_23331_C

09 October 2023

Dear West Nurseries,

RE: Consent to discharge surface water run-off into a riparian watercourse via an overflow pipe from a new storage lagoon at West Nurseries LTD, 20 Mallard Road, Spalding

Further to your application for the above, I am pleased to be able to grant consent on behalf of the Board under the terms of its Byelaws and the Land Drainage Act 1991 for the works detailed below. Consent is granted subject to compliance with the specifications and conditions listed below. Please inform the Board **within 28 days of the date of this letter** if you do not accept these. Nil response by this deadline will be taken as acceptance of the conditions.

South Holland Internal Drainage Board ("the Board"), in exercise of its powers under Byelaw 3 of the Byelaws, and subject to the conditions and the specifications attached, hereby grants consent to the works or operations described in the Consent.

Consent reference:	23_23331_C
Date consent shall come into effect:	09/10/2023
Grantee:	West Nurseries LTD 20 Mallard Road Low Fulney Spalding PE12 6ND
Watercourse:	Privately maintained riparian watercourse
Location:	Same as Grantee address
Map Grid Reference:	E=527084 , N=321984

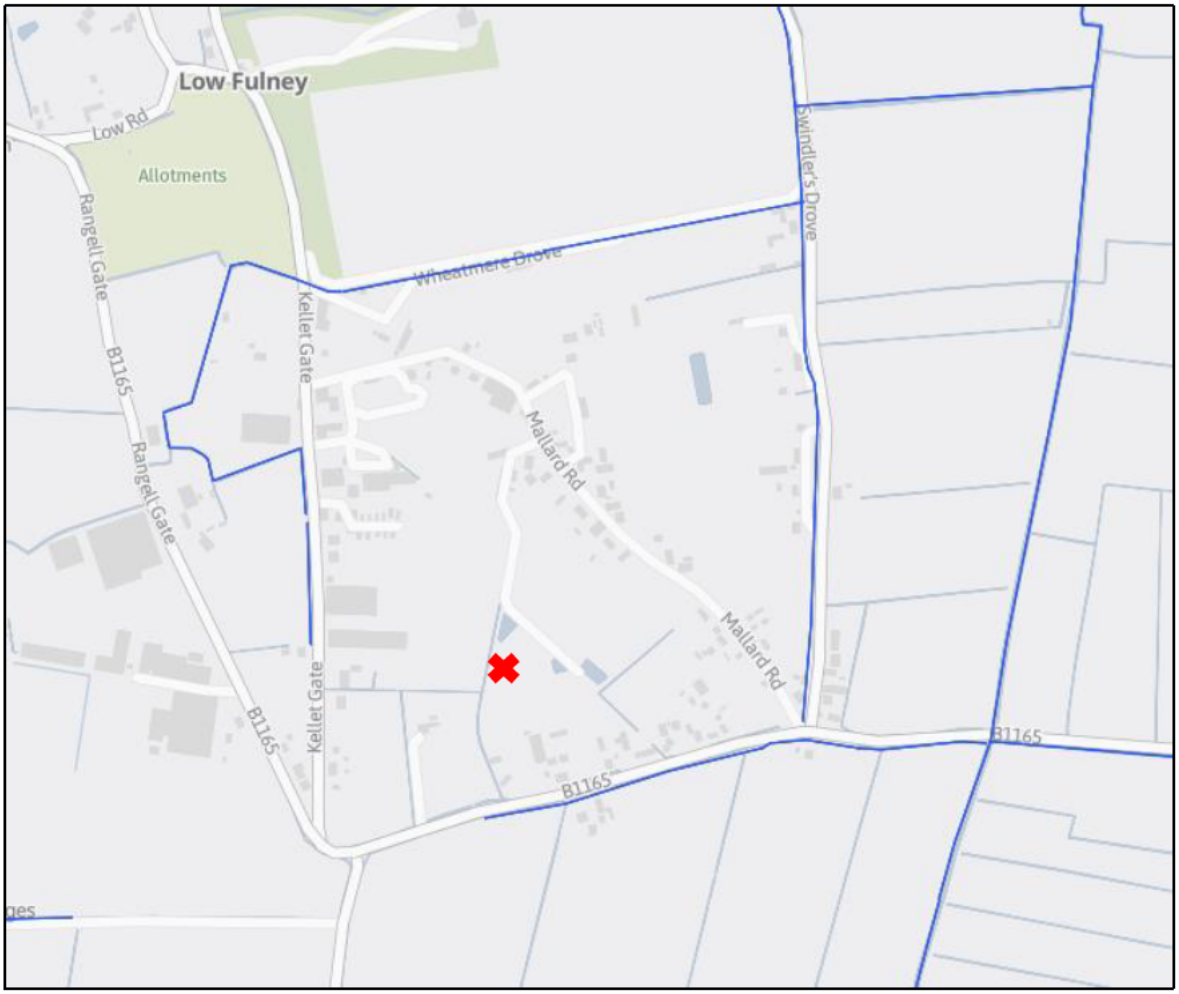
Duncan Worth (Chairman) Simon Bartlett (Vice-Chairman)

Phil Camamile (Chief Executive)

Constituted by The Anglian Water Authority (Sou h Holland Internal Drainage District) Order 1974,
Statutory Instrument 1974 No.1209

Description of works: Discharge of surface water into a riparian watercourse via an overflow pipe from a new storage lagoon constructed at West Nurseries LTD, 20 Mallard Road, Spalding.

Map and Site plans



Map 1: Board maintained watercourses in dark blue, site location shown by red cross (Ordnance Survey Licence Number 100029527, Crown Copyright 2023, all rights reserved).

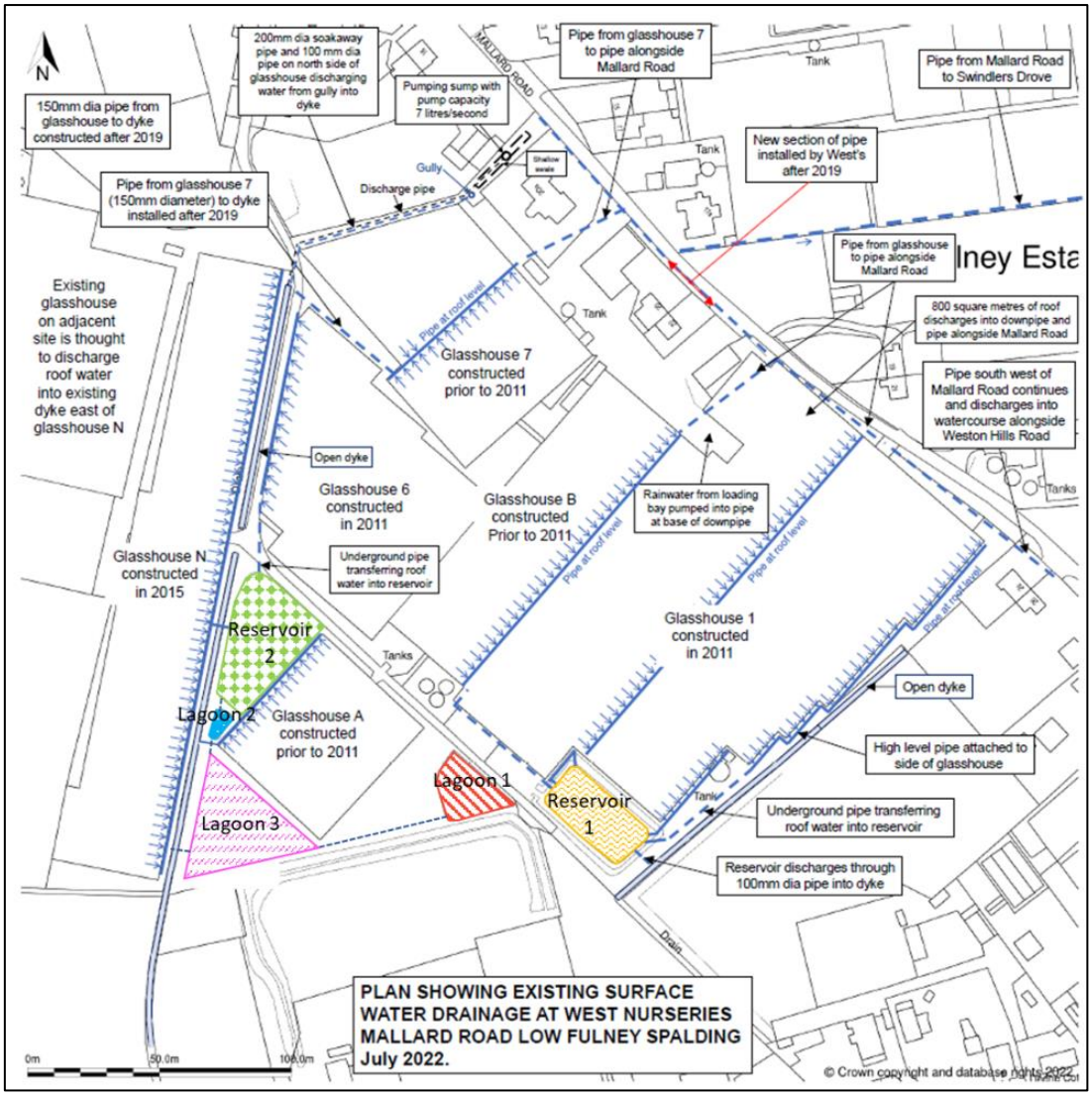


Figure 2: Annotated plan showing location of existing reservoirs 1 & 2, existing lagoons 1 & 2 and proposed lagoon 3. Base plan taken from drawing number: 2022_07_25 Plan of Site A2 (S Hemmings 07/22) and annotated by the Board (02/10/2023).

Definitions of Features / Structures:

- Reservoir 1 is the existing surface water storage/attenuation feature shown in orange as Reservoir 1 within figure 2 of this document.
- Reservoir 2 is the existing surface water storage/attenuation feature shown in green as Reservoir 2 within figures 2 & 3 of this document.
- Lagoon 1 is the existing attenuation feature shown in red as Lagoon 1 within figures 2 & 3 of this document.
- Lagoon 2 is the existing attenuation feature shown in blue as Lagoon 2 within figures 2 & 3 of this document.
- Lagoon 3 is the proposed attenuation feature shown in pink as Lagoon 3 within figures 2 & 3 of this document.

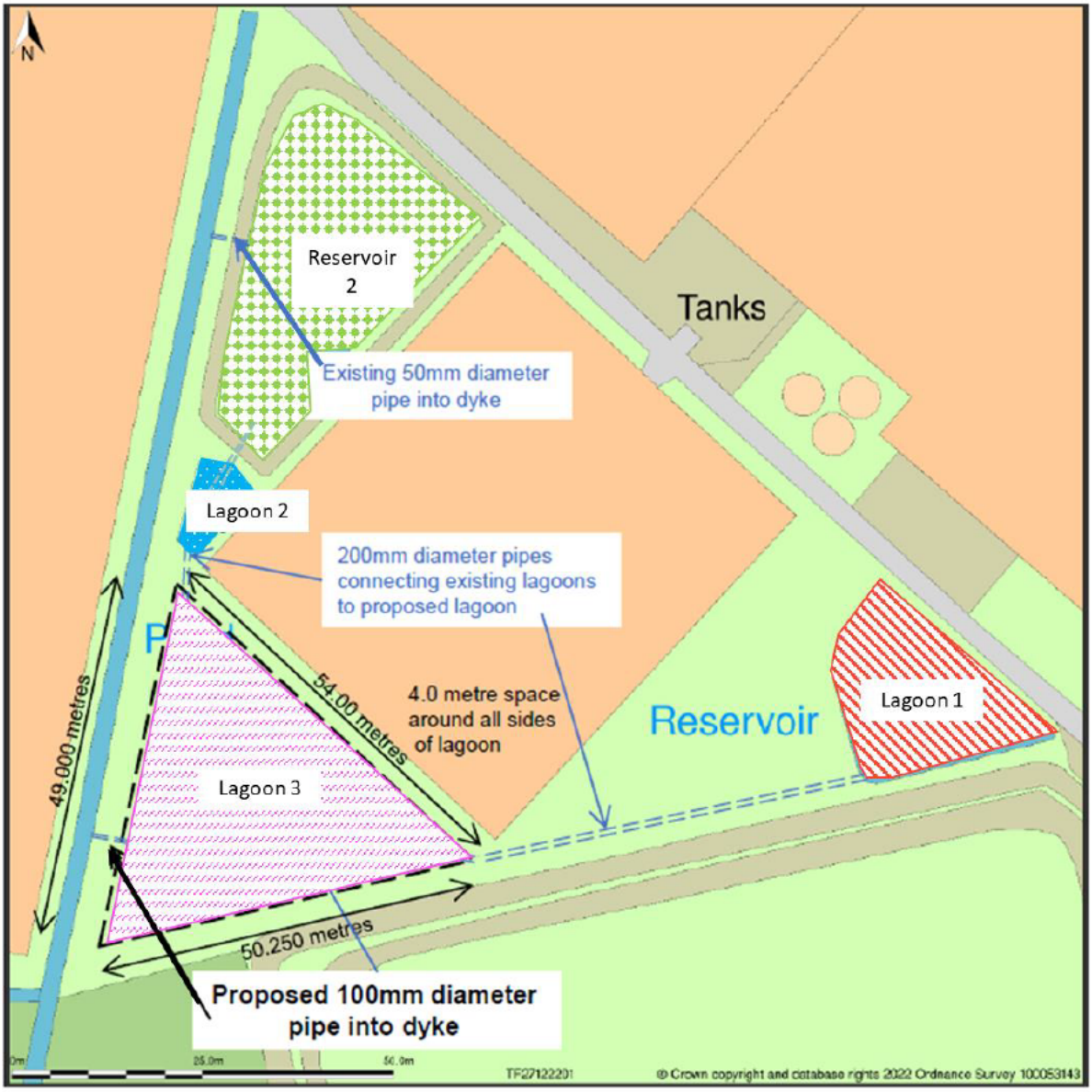


Figure 3: Annotated plan showing location of new lagoon 3 in pink, existing reservoir 2 in green and existing lagoons 1 & 2 in red and blue respectively. Base drawing taken from drawing: Plan of Proposed Works (S Hemmings 24/07/2023) and annotated by the Board (02/10/2023).

Conditions:

C1 You must construct the flood risk alleviation feature known as Lagoon 3 as shown in figures 2 & 3 and to the size as designed in documents *2023_01_16 Second Review of Surface Water Drainage (S.Hemmings, 16/01/2023)* (Annex B), drawing *Plan of Proposed Works (S Hemmings 24/07/2023)* & *2023_07_19 Surface Water Lagoon Details (S.Hemmings, 19/07/2023)* (Annex A) and as specified below.

C2 Officers must be allowed to inspect the works if they request to do so. Please complete the Notice to Commence Works form included with this consent and return (via email or post) to the Board or alternatively please call this office to notify the Board of when you intend to start construction.

C3 Consent is granted subject to the proposed works being completed within 3 years of the date of this letter. Failure to complete the works in accordance with this time period, and/or in compliance with the conditions contained in this letter, may result in this consent being invalidated and could necessitate the removal or remediation of any works. Within this time period the consent cannot be sold, inherited or otherwise passed on without prior written agreement being obtained from the Board, unless the works have previously been completed in accordance with the conditions/specification contained herein.

C4 No additional impermeable surfaces which might generate run-off are to be constructed on site unless prior consent is obtained from the Board.

C5 All on site drainage is to be maintained by the Grantee.

C6 The applicant is responsible for ensuring that the surface drainage system is designed so that (unless an area is designated to hold and/or convey water) no flooding occurs on any part of the site in a 1 in 30 year rainfall event (plus climate change), and that flooding does not occur in any part of a building or offsite during a 1 in 100 year (plus climate change) rainfall event.

C7 The storm surge attenuation elements of Reservoirs 1 & 2 must be drained down as soon as possible after a rainfall event so that there is storage capacity for subsequent rainfall events.

C8 Lagoons 1, 2 and 3 must be drained down as soon as possible after a rainfall event so that there is storage capacity available for subsequent rainfall events.

Specifications:

S1 Consent is granted for the surface water overflow from Reservoir 2 via Lagoon 2 & Lagoon 3 and from Lagoon 1 via Lagoon 3 to discharge through a 100mm diameter pipe into the private watercourse E=527067, N=321979 and as shown in figure 3 above.

S2 Lagoon 3 must have a capacity of at least 986.4 cubic metres as per document *2023_01_16 Second Review of Surface Water Drainage (S.Hemmings, 16/01/2023*) (Annex B).

S3 The invert level of the discharge pipes connecting the following features must be installed at the bed level of the lagoons so that they can drain down completely.

- Reservoir 2 to Lagoon 2
- Lagoon 2 to Lagoon 3
- Lagoon 1 to Lagoon 3

These features must be kept empty as far as is practicable to ensure there is sufficient capacity to accommodate extreme events.

S4 The invert level of the pipe from Lagoon 3 to the adjacent private watercourse must be installed at the bed level of the watercourse. A non-return flap valve must be fitted to the end of the pipe entering the watercourse to prevent any back flow of water from the watercourse when water levels rise above the invert of the outfall pipe.

S5 Headwall: When constructing a new outfall, this should enter the watercourse through a suitably-sized pre-cast concrete recessed headwall unit. The headwall and pipe should be installed so that it is flush with the batter of the watercourse with no part protruding beyond the existing bank profile at any point.

S6 Revetment: You should ensure that the outfall from this drainage system has suitable erosion protection (stone revetment), across the drain bed and up the far bank (to the same level as the discharge pipe), for at least one metre either side of the pipe edge/ headwall to prevent any scouring of the bank of the watercourse. All erosion protection must be dug into the bank and bed so that no item protrudes beyond the existing batter and bed profile at any point. All material which is excavated as part of the headwall installation is to be removed from the watercourse, with the area around the new headwall and erosion protection restored to its previous condition as soon as possible.

In addition to the above, please be aware of the following informative conditions.

I1 All references in this letter to the Board are to be construed as including successor organisations to the current Board.

I2 No part of this consent shall adversely affect the Board's rights or responsibilities as defined in the Land Drainage Act 1991 or in its Byelaws, unless those rights or responsibilities are expressly varied herein.

I3 Other than the works consented in this letter, you must not make alterations to any watercourse, or otherwise infringe the Board's Byelaws or the current or any future Land Drainage Act, unless prior written consent is obtained from the Board.

I4 This consent cannot be taken to mean that the proposed works will comply with the requirements of any other interested parties, including the Local Planning Authority, Water Company, land owners or occupiers, and it's your responsibility to ensure that they do. The Board cannot be held liable if the works outlined in this letter are carried out and are not acceptable to any other interested party, or for any possible implications arising from this.

I5 The Board cannot be held liable for damage to any services crossing, or adjacent to, the areas of land where you will be undertaking these works, howsoever caused. It is therefore entirely your responsibility to locate and avoid any such services.

I6 It is the applicant's responsibility to ensure no loss of protected species or habitat as a result of the consented works. This may require the undertaking of an environmental survey. You should seek specialist advice as to the need for this and implement mitigation if specified.

I7.2 The discharge is to consist solely of surface water run-off and must not include any treated foul water (unless otherwise consented separately). All surface water discharged to the watercourse must be free from contamination.

I8.1 The applicant is responsible and liable for the design and installation of the proposed works. Where there are any problems caused to others due to these planned or associated works, then the applicant will be held liable and be responsible to ensure that these are rectified.

I9 It's possible that the outfall from this drainage system may be submerged during times of high rainfall and flows. The Board cannot be held liable should this cause any problems in your drainage systems. The effect of a submerged outfall may be to restrict the rate of discharge from the system. This constraint may require additional storage capacity to be provided in your system. It may also be advisable to install a non-return valve or flap on the end of the discharge pipe or outfall structure to limit the impact of high water levels in the receiving watercourse on your system.

I10.1 The Board is not responsible for the operation and ongoing maintenance (including repair) of the outfall or any elements of the drainage system served by the outfall. You must ensure that responsibility for ownership, maintenance and operation of each and every element of the drainage system that is part of the proposed works and that is served by the outfall is clearly-defined and transferred to the relevant Risk Management Authority, Management Company or individual property owners as appropriate. For the purposes of clarity, where the land or property owner is also the riparian owner, they are responsible for the maintenance of their sections of the watercourse.

I12 The works are all to be undertaken entirely at your expense.

I13 The Board highly recommends that adequate space (3-5m) be left empty and flat adjacent to all privately maintained watercourses to facilitate future riparian maintenance.

Authorisation

Signed on behalf of South Holland Internal Drainage Board

[redacted]

Phil Camamile, Chief Executive, Water Management Alliance

If you require any further information, please do not hesitate to contact me.

Kind Regards,

Rachael

Rachael Yeowell
Sustainable Development Officer
Water Management Alliance

NOTICE TO COMMENCE WORKS

To:

SOUTH HOLLAND INTERNAL DRAINAGE BOARD
PIERPOINT HOUSE
HORSLEY'S FIELDS
KING'S LYNN
NORFOLK
PE30 5DD

RE: Consent to discharge surface water run-off into a riparian watercourse via an overflow pipe from a new storage lagoon at West Nurseries LTD, 20 Mallard Road, Spalding

Consent Reference: 23_23331_C

I hereby give notice that I intend to start on _____ in accordance with the above consent.

Signed: _____

Print: _____

Date: _____

Annex A - *2023_07_19 Surface Water Lagoon Details (S.Hemmings, 19/07/2023)*

SURFACE WATER DISPOSAL AT WESTS NURSERIES, MALLARD ROAD, LOW FULNEY, SPALDING, PE12 6ND.

DETAILS OF SURFACE WATER LAGOON

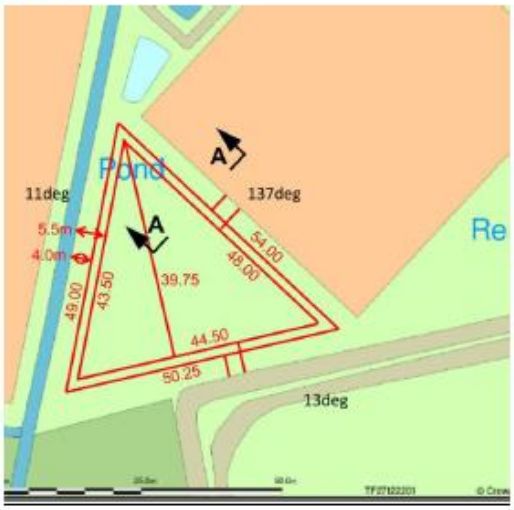
Introduction

The required dimensions of this lagoon have been designed in a separate document. The lagoon will be formed by excavating the triangular area south west of the existing glasshouse 1.0 metre deep with side slopes with a slope of 1.5 to 1.0 (approximately 34 degrees to the horizontal). The angle of the side slopes will be similar to the batter of the dyke on the western side of the lagoon.

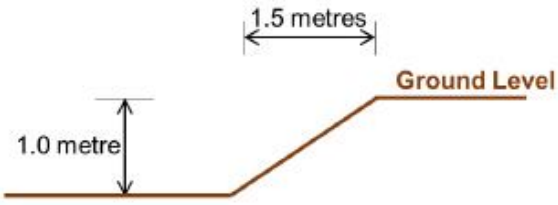
The lagoon will not be lined. The side slopes and base will be grassed which will be managed along with all of the grassed areas on the site.

The lagoon has been designed only to receive excess water from the existing lined reservoir on the north western side in heavy rainfall situations. At the present time it may only be filled with water for a period of a few days every 3 to five years, and therefore for 99% of the time the lagoon will be empty.

Plan of Proposed Lagoon



Section A-A



Annex B *2023_01_16 Second Review of Surface Water Drainage (S.Hemmings, 16/01/2023*)

SURFACE WATER DISPOSAL AT WESTS NURSERIES, MALLARD ROAD, LOW FULNEY, SPALDING, PE12 6ND.

SECOND REVIEW OF SURFACE WATER DRAINAGE

Page 2	Introduction.
Pages 2 and 3	Drainage from Glasshouse 6
Page 3	Design of Reservoir in 2014.
Page 3 and 4	Redesign of Reservoir.
Page 5	Proposed New Lagoon
Pages 6 and 7	Redesign of Drainage from glasshouses 1 and B
Page 8	Schedules of Outfalls into Dyke
Page 9	Plan of Existing Outfalls into Dyke East of Glasshouse N
Page 10	Plan of Proposed Works

S M Hemmings B Sc C Eng MICE MIWEM,
13 Lea Gardens,
Peterborough,
PE3 6BY.

E mail: [redacted]

Telephone: [redacted]
Mobile: [redacted]

16th January 2023

Introduction

A document was written in 2022 entitled "Review of Surface Water" which was sent to South Holland Internal Drainage Board on 28th January 2022 and a further revision was submitted on 25th July 2022

The report was discussed at a meeting which took place on 17th November 2022 where South Holland IDB, Lincolnshire County Council and South Holland DC were represented. This "Second Review" details this proposal with an increased size of lagoon and the addition of a low bank to be placed alongside the dykes on the west side of glasshouse A.

Drainage from Glasshouse 6

The original report details how a larger than planned glasshouse 6 was built in 2011 to replace the original glasshouse, and the planned storage lagoon for this glasshouse was not constructed. Between 2011 and 2015 it is presumed the drainage from this glasshouse was discharged into the dyke on the west side of glasshouse A.

Area of glasshouse 6 = 5910 square metres.

Then in 2015 glasshouse N was constructed and a lined reservoir was constructed to store surface water from this new glasshouse. The new reservoir was constructed as planned and a 50mm outfall allows excess water from the reservoir to flow into the dyke so that there is always the upper 1.0 metre of the reservoir available to receive excess rainfall. West Nurseries re-use the water from this reservoir and therefore during the summer months there is often a depth in excess of 1.0 metre available for rainfall from glasshouse N

Area of glasshouse N = 8064 square metres.

Volume of top 1.0 metre of reservoir = 499 cu m

After the construction of the reservoir West Nurseries decided to discharge the rainfall from glasshouse 6 into the new reservoir. Therefore now a significant additional volume of water from both glasshouses is being discharged into the reservoir.

Area of glasshouses N and 6 = 13974 square metres.

Design of Reservoir in 2014

The original design of the reservoir was based on the following spreadsheet.

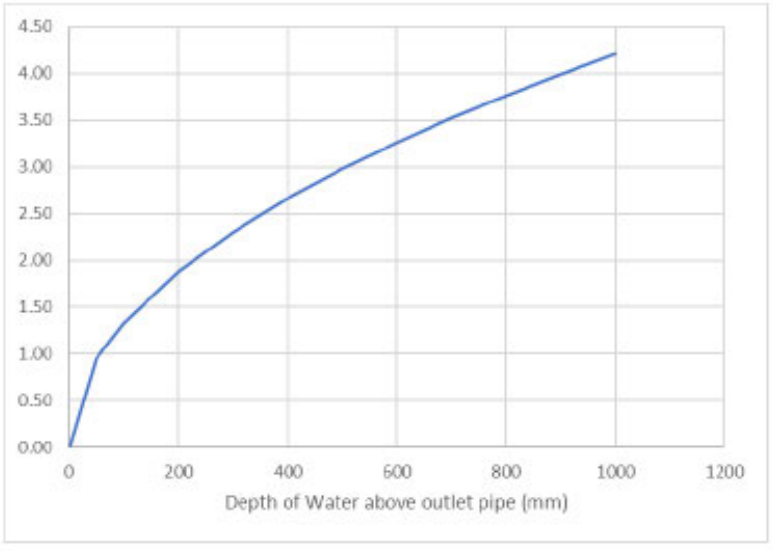
WEST NURSERIES PULNEY SPALDING
VOLUME OF DISCHARGE FROM PROPOSED GLASSHOUSE
Using Wallingford Proceedure
Area of proposed glasshouses = 8064sq.m.

Duration mins	M5-60min mm	Z1	M5-D mm	Z2	M100-D	Intensity mm/hour	Areal factor	Areal Intensity	Area ha	Impervious Factor	Impervious Area ha	Q1 litres/sec	Volume Cu m	Q1 + 20% litres/sec	Volume Cu m
15	20	0.64	12.8	1.98	25.34	101.38	0.94	95.29	0.81	0.9	0.73	192.11	172.90	230.53	207.48
30	20	0.81	16.2	1.97	31.91	63.83	0.95	60.64	0.81	0.9	0.73	122.24	220.04	146.69	264.05
60	20	1.00	20.0	1.93	38.60	38.60	0.96	37.06	0.81	0.9	0.73	74.70	268.94	89.65	322.73
120	20	1.21	24.2	1.89	45.74	22.87	0.97	22.18	0.81	0.9	0.73	44.72	321.99	53.66	386.39
180	20	1.35	27.0	1.87	50.49	16.83	0.97	16.33	0.81	0.9	0.73	32.91	355.44	39.49	426.53
240	20	1.40	28.0	1.86	52.08	13.02	0.97	12.63	0.81	0.9	0.73	25.46	366.64	30.55	439.96
300	20	1.55	31.0	1.84	57.04	11.41	0.98	11.18	0.81	0.9	0.73	22.54	405.69	27.05	486.83
360	20	1.62	32.4	1.83	59.29	9.88	0.98	9.68	0.81	0.9	0.73	19.52	421.71	23.43	506.05
480	20	1.76	35.2	1.81	63.71	7.96	0.98	7.80	0.81	0.9	0.73	15.73	453.15	18.88	543.78
600	20	1.75	35.0	1.81	63.35	6.34	0.98	6.21	0.81	0.9	0.73	12.52	450.57	15.02	540.69

The figure of 541.0 cu metres was used in the original design and a small lagoon was constructed to cater for the additional 42 cu m of water. The calculation showed the reservoir would overflow in a 1 in 100 year event with 20% added for climate change. This calculation does not take into account the volume that outflows from the 50mm pipe into the dyke during the event.

Redesign of Reservoir

The following spreadsheet has been produced to calculate the flows now that the reservoir receives the discharge from an area of 13974 square metres. This calculation assumes the existing 50mm pipe discharges water from the reservoir into the dyke as it does at the present time. Therefore a figure of 3.0 litres/second has been included in the calculation, based on the graph below.



1 in 100 year rainfall with 20% Climate Change

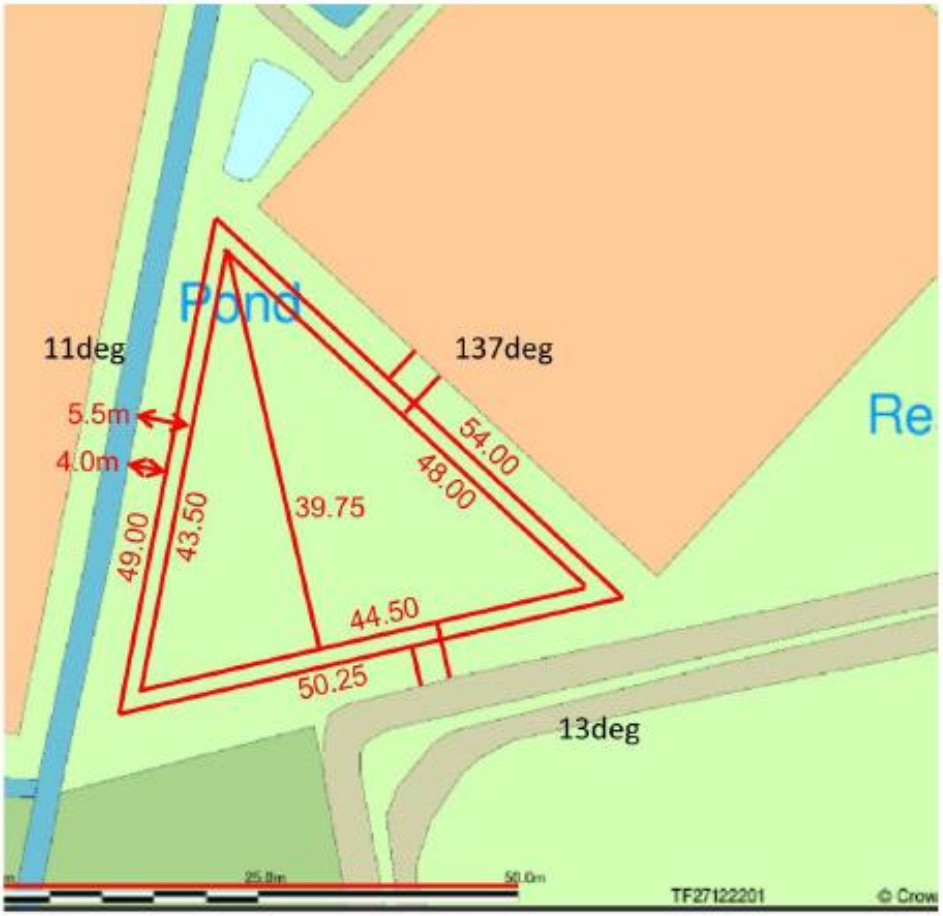
Impermeable area of N to be drained	8064	sm
Impermeable area of 6 to be drained	5910	sm
Total area to be drained	13974	
Discharge Rate into IDB drain	3	litres/second

Duration minutes	Growth Factor Z1	M5 rainfall	Growth Factor Z2	M100-D rainfall + 20%	Intensity mm/hour	Inflow	Outflow	Storage Required
5	0.37	7.4	1.98	17.6	211.0	245.7	0.90	244.8
10	0.52	10.4	1.98	24.7	148.3	345.3	1.80	343.5
15	0.63	12.6	1.98	29.9	119.8	418.3	2.70	415.6
30	0.8	16.0	1.97	37.8	75.6	528.6	5.40	523.2
60	1	20.0	1.93	46.3	46.3	647.3	10.80	636.5
120	1.21	24.2	1.89	54.9	27.4	767.0	21.60	745.4
240	1.45	29.0	1.86	64.7	16.2	904.5	43.20	861.3
360	1.6	32.0	1.83	70.3	11.7	982.0	64.80	917.2
600	1.79	35.8	1.81	77.8	7.8	1086.6	108.00	978.6
1440	2.24	44.8	1.81	97.3	4.1	1359.7	259.20	1100.5

Therefore the storage volume required is 1100.5 cu m. There is already a storage volume in the reservoir of 499 cu m and therefore any new lagoon needs to have a minimum volume of 1100.5 – 499 = 601.5 cu m. Details of a storage lagoon which will be of sufficient size to retain this volume is shown on the next page.

Proposed New Lagoon

A new lagoon is proposed south west of glasshouse A as shown in the plan below. The outer red line of the is the top of the bank of the lagoon, and the inner line is the edge of the base which is 1.0 metre deep. The sides of the lagoon will be excavated with a slope of 1.5:1.0.



Area of base of lagoon = 0.5 x 44.5 x 39.75 = 884.4 sm

Volume above base = 1.0 x 884.4 = 884.4 cu m

Volume of edges = (43.5 + 48.0 + 44.5) x 1.5 x 1.0 x 0.5 = 102 cu m

Total volume of lagoon = 986.4 cu m

Therefore there is an adequate volume in the lagoon to accommodate the outfall from the reservoir constructed in 2015.

Redesign of Drainage from Glasshouses 1 and B

The areas of the above glasshouses are shown below.

Glass House	Area (sm)	Discharge
1	17190	95% into reservoir R1 5% into north piped dyke
B	4769	75% into reservoir R1 25% into north piped dyke

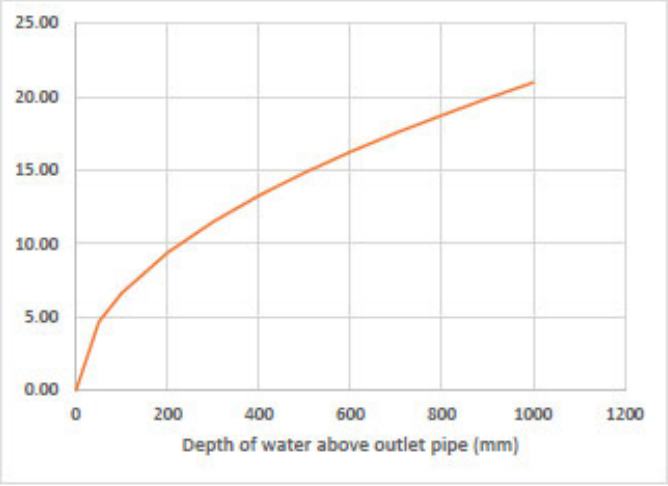
Total area of glasshouses discharging into reservoir R1
= (0.95 x 17190) + (0.75 x 4769) = 19,907 square metres.

The lined reservoir was constructed in 2011 and the overall size is approximately 46.5 metres x 26.5 metres, smaller than the original design approved in the planning application. It is estimated that the size of the base is 24.3 metres x 4.3 metres, the total depth is 4.75 metres and the side slope (1 : 1½ slope) is 6.75 metres horizontally. A calculation of the volume of a 1.0 metre depth of water between water depths of 3.5 metres and 4.5 metres is shown below.

	Water Depth		Top Volume
	4.5 metres	3.5 metres	
Volume Above Base	470.2	365.7	
Volume of sides	738.1	446.5	
Volume of Sides	130.6	79.0	
Volume of corners	273.4	128.6	
	1612.3	1019.9	592.4

The following spreadsheet has been produced to calculate the flows from an area of 19907 square metres.

This calculation allows the existing 100mm pipe to discharge water from the reservoir into the dyke as it does at the present time. Therefore a figure of 10.0 litres/second has been included in the calculation, based on the graph below.



1 in 100 year rainfall with 20% Climate Change

Total area to be drained 19907

Discharge Rate into IDB drain 10 litres/second

Duration	Growth Factor Z1	M5 rainfall	Growth Factor Z2	M100-D rainfall + 20%	Intensity mm/hour	Inflow	Outflow	Storage Required
5	0.37	7.4	1.98	17.6	211.0	350.0	3.00	347.01
10	0.52	10.4	1.98	24.7	148.3	491.9	6.00	485.91
15	0.63	12.6	1.98	29.9	119.8	596.0	9.00	586.97
30	0.8	16.0	1.97	37.8	75.6	753.0	18.00	734.96
60	1	20.0	1.93	46.3	46.3	922.1	36.00	886.09
120	1.21	24.2	1.89	54.9	27.4	1092.6	72.00	1020.61
240	1.45	29.0	1.86	64.7	16.2	1288.5	144.00	1144.54
360	1.6	32.0	1.83	70.3	11.7	1398.9	216.00	1182.90
600	1.79	35.8	1.81	77.8	7.8	1547.9	360.00	1187.92
1440	2.24	44.8	1.81	97.3	4.1	1937.1	864.00	1073.06

Therefore the storage volume required is 1187.9 cu m. There is already a storage volume in the reservoir of 592.4 cu m and therefore any new lagoon needs to have a minimum volume of 1187.9 – 592.4 = 595.5 cu m.

The existing lagoon west of the reservoir has a volume of 425 cu m. Therefore a volume of 170.5 cu m needs to be transferred to the proposed new lagoon detailed on page 4 of this report.

Therefore the new lagoon needs to have a minimum volume of 170.5 + 559.6 = 730.1cu m. This is less than the volume provided which is 986.4 cu m.

Schedules of Outfalls into Dykes

Schedule of Outfalls into Dyke Shown on Planning Applications in 2011 and 2014

Year	Outfall	Diameter
2011	From proposed lagoon west of glasshouse 6	75mm
2011	From lagoon south of reservoir 1	50mm
2014	From Reservoir 2	50mm

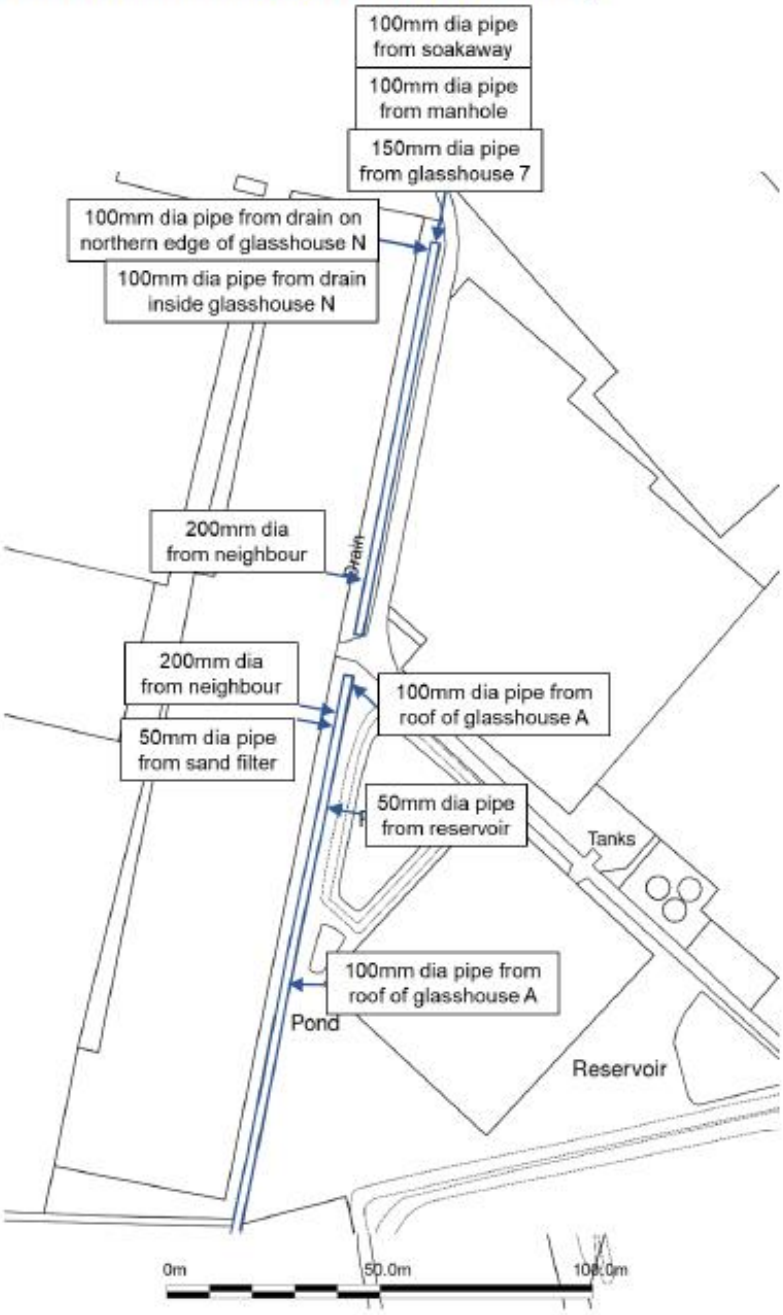
Schedule of Existing Outfalls into Dyke

Year	Outfall	Diameter
2011	From Reservoir 1	100mm
2011	From lagoon south of reservoir 1	50mm
2014	From Reservoir 2	50mm

Proposed Schedule of Outfalls into Dyke following excavation of lagoon

Year	Outfall	Diameter
2011	From Reservoir 1 (Existing)	100mm
2014	From Reservoir 2 (Existing)	50mm
2014	From lagoons (Proposed)	100mm

Plan of Existing Outfalls into Dyke East of Glasshouse N



Plan of Proposed Works

