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REPORT

TO: David Carrott

FROM: John Adlam

DATE: 1st June 2021

SUBJECT: Nursery tunnel development.

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Plant groups

The attached spreadsheet gives a grouping of the plants into Shrubs, Herbaceous perennials, and Grasses.
It would be an advantage for these groups to be treated individually with respect of water, pest control and trimming. The spreadsheet can be manipulated to show plants groups or names.

Rainwater storage

Due to space difficulties consider a series of surface tanks in place of the storage swales. With a 4m gutter height a tank 3.05m high could be used. A series of 3 tanks collecting rainwater from each of the two structures would hold the same volume as proposed rainwater storage in the Shuttleworth report. Each tank would be 9.14m in diameter and 3.05m high and holding, with a 150mm freeboard holds 190 m^3.
Irrigation water could be taken from a low level in the tanks and an overflow at say 300mm from the top could deal with the winter period when irrigation would be lower than rainfall. The overflow would be piped or carried in a swale to the storm water attenuation pond.
We have used the Shuttleworth rainfall calculations but have used our own irrigation requirements based on our experience of over head spray line systems. The tanks would have a pump taking water from the bottom and pumping it to the existing irrigation tank for onward distribution to the nursery system.

Calculated water storage and use

For the two blocks we have shown a pattern of water use for each month of the year based on the 9cm crop usage which is shown, shaded green. It can be seen that very little mains water would be required with the 500 m^3 storage tanks in place at each glasshouse site.

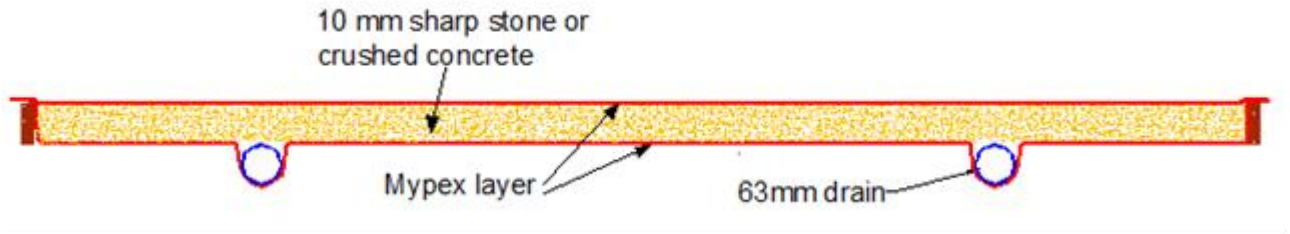
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	Rainfall Adjusted mm		Tunnel 1 Rainfall	Tunnel 1 Irrigation	Disharge to attenuation pond	Mains water top up
			6,073 M²			
Jan	45	48.80	207	77	131	
Feb	38	41.20	175	153	22	
Mar	33	35.80	152	255		103
Apr	40	43.40	184	383		198
May	33	35.80	152	638		485
Jun	33	35.80	152	765		613
Jul	48	52.10	221	791		569
Aug	52	56.40	240	791		551
Sep	52	56.40	240	765		525
Oct	56	60.80	258	383		124
Nov	50	54.30	231	153	78	
Dec	36	39.10	166	77	90	
	516	560	2,380 M³	5,229 M³	321 M³	3,169 M³

	Rainfall Adjusted mm		Tunnel 2 Rainfall	Tunnel 2 Irrigation	Disharge to attenuation pond	Mains water top up
			6,681 M²			
Jan	45	48.80	228	84	144	
Feb	38	41.20	193	168	24	
Mar	33	35.80	167	281		113
Apr	40	43.40	203	421		218
May	33	35.80	167	702		534
Jun	33	35.80	167	842		674
Jul	48	52.10	244	870		626
Aug	52	56.40	264	870		606
Sep	52	56.40	264	842		578
Oct	56	60.80	284	421		137
Nov	50	54.30	254	168	86	
Dec	36	39.10	183	84	99	
	516	560	2,618 M³	5,752 M³	353 M³	3,486 M³

Bed construction.

We discussed the construction of the beds in the houses.



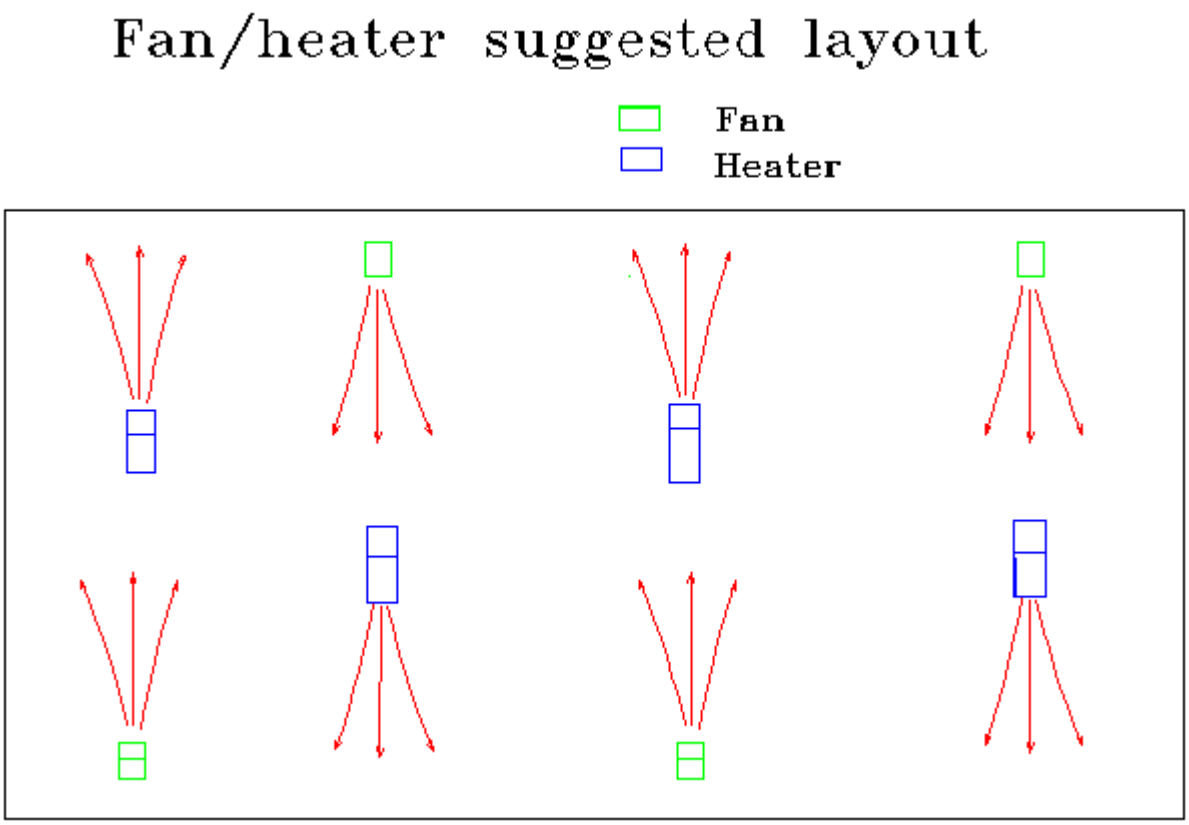
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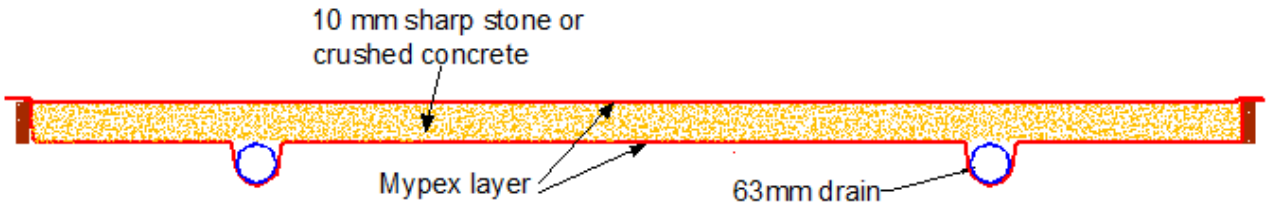
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The digging of the drains for bed drainage could be easily carried out with a pedestrian controlled trencher such as detailed in our recent email.

Heating system.
To heat the two structures we have used the given parameters of a: 5°C lift -1° to +4° or +5° to +10°C as an example, a single skin polythene tunnel and using air heaters.
With size of the structures multiple heaters would be needed to ensure even distribution of heat.
The heart loss for a single skin tunnel 96m wide and 71m long, with 10 spans, giving a temperature lift of 5°C would be 600,000kW/h. For suspended heaters I would suggest a series of 6 x 100kW heaters pointing away from the central pathway. In conjunction with the fans this would give you good distribution of the heat.



Bed drains
With each bay of 9.6m allow two 63mm or 75mm slotted drains in each bay placed in a minimum 75mm depression.
The soil surface should be covered with a ground cover material and include the two depressions for the drains.



The bed drains should be connected into a 200mm cross drain which would discharge outside the

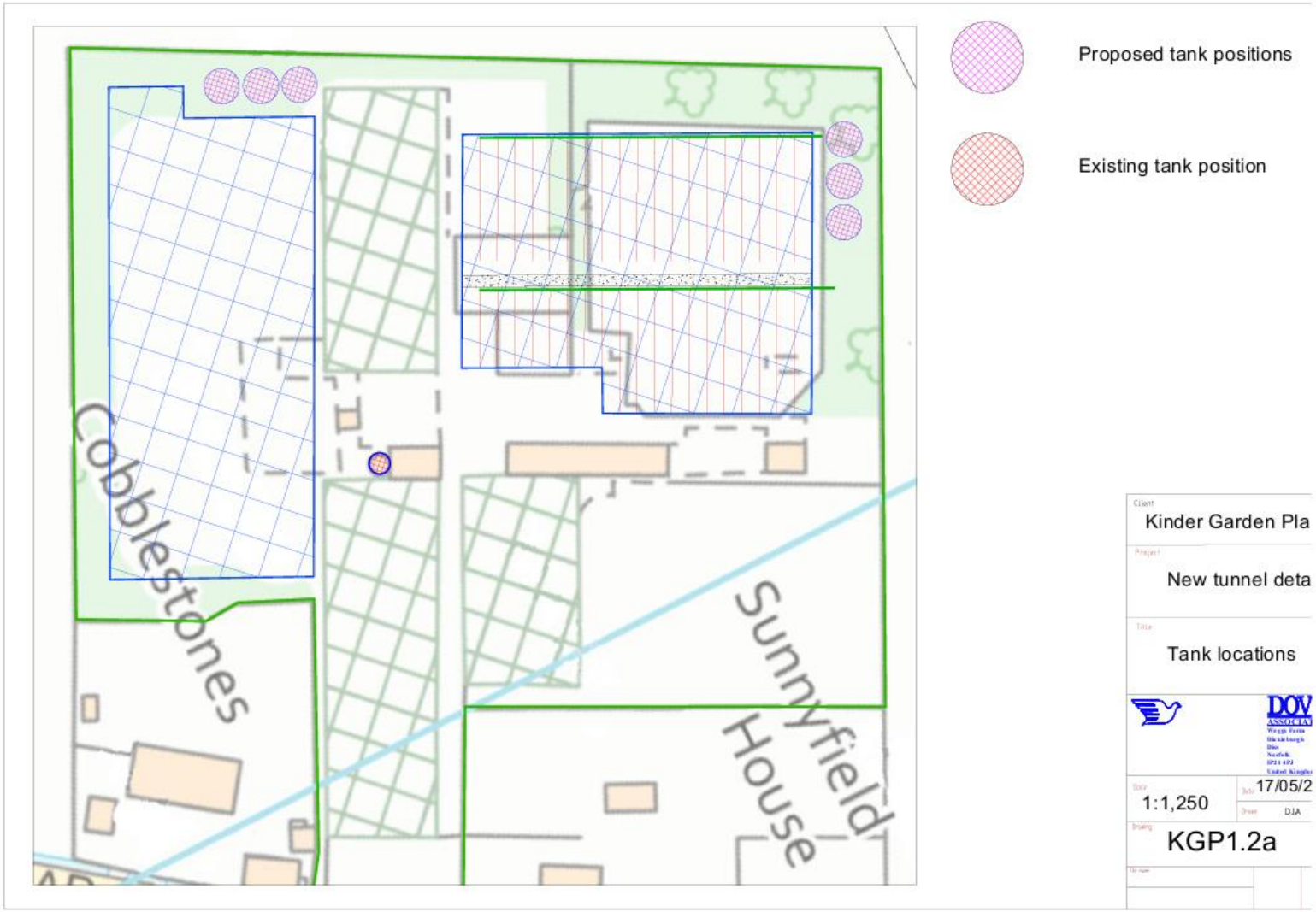
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house and into the attenuation pond.

Crop support
We would be able to support your crops with visits during your first year to assist in crop protection products, biological control programmes, and husbandry advice.

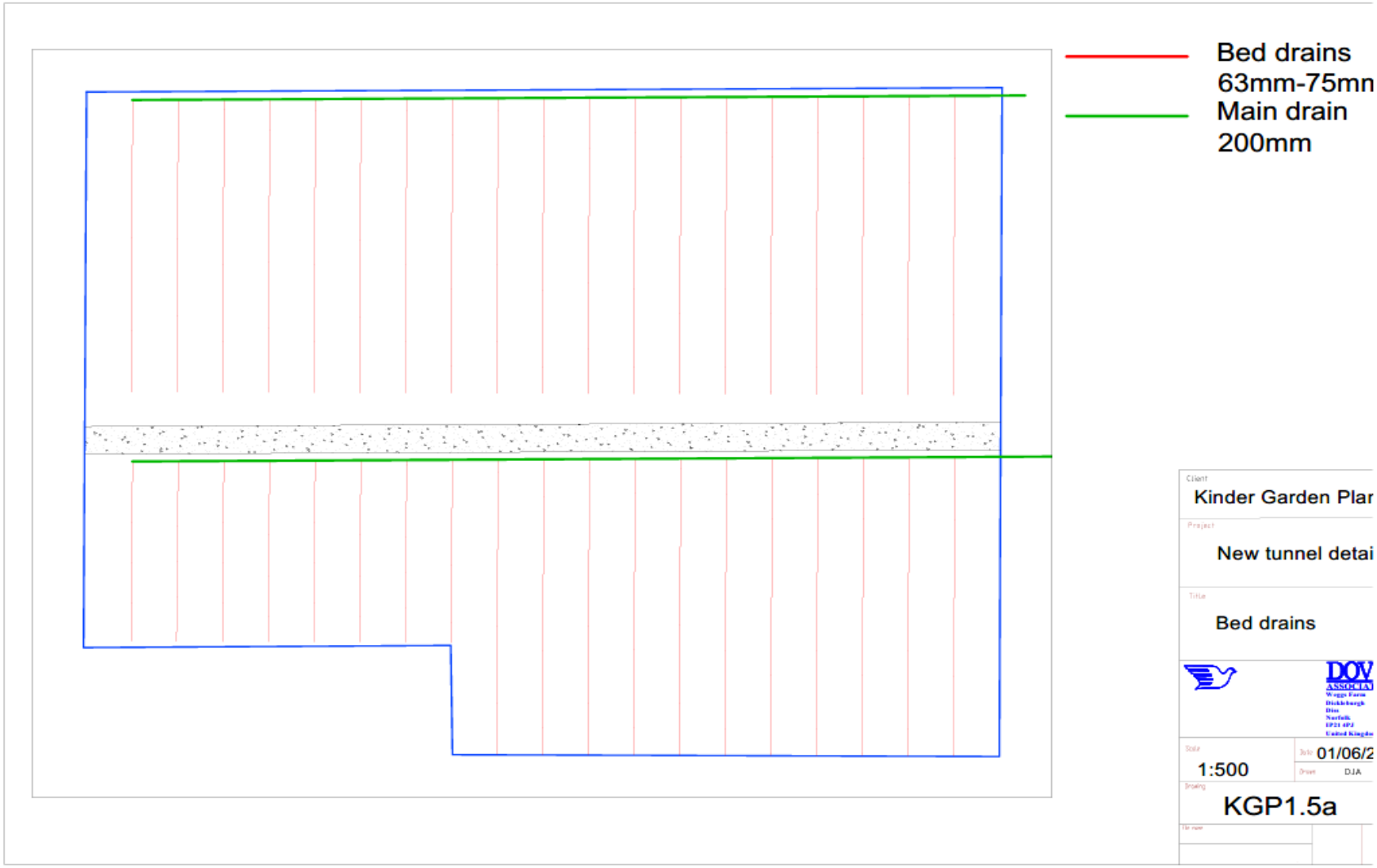
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Appendix 1



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Appendix 2



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