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Flo-Gro Systems Limited

Proposed aquaculture development, Decoy Farm, Spalding Road, Crowland, Lincolnshire, PE6 0LU

Surface Water Drainage Strategy Phase 1

1st September 2022

T. R. Stafford
Senior Partner

DRAINAGE STRATEGY

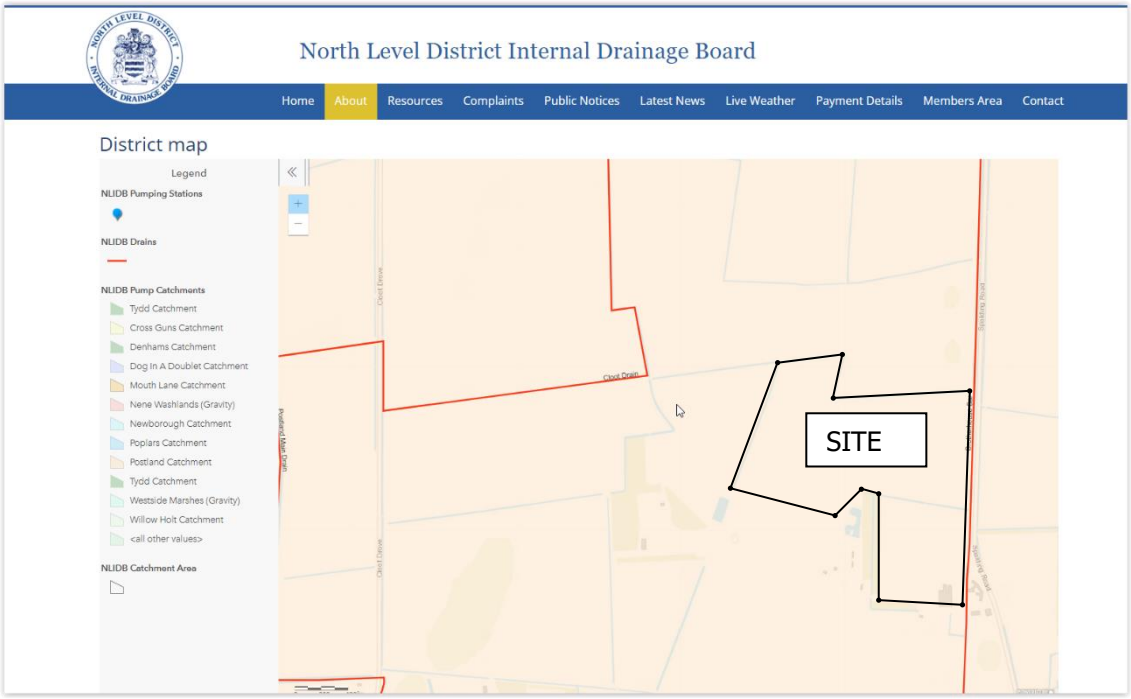
SUMMARY

Flo-Gro Systems Ltd. are proposing to develop an aquaculture site over three Phases on a parcel of land adjacent to Decoy Farm, Spalding Road, Crowland, Lincolnshire.

This strategy concerns Phase 1 but has been developed after taking into account the two future phases.

THE SITE

The site sits directly off Spalding Road and is approximately 15.6ha with ground levels ranging from 1.81mOD in the south-east to 0.46mOD in the north-west.



It has open riparian watercourses to the western and northern boundaries and North Level IDB's Brotherhouse Drain to the East between the site and Spalding Road. It should be noted that the IDB will be asked to consent the culverting of this entrance crossing.

The phase 1 works include the southern access, the main lorry turning areas, the Process Building, Hatchery and Grow Out Units 1 & 2 along with some access roads, staff and disabled parking and the attenuation pond and offsite ditchworks.

Continued

Whilst there is an IDB drain immediately adjacent to the site, the layout, once all three phases have been developed, does not allow the main surface water attenuation to sit anywhere else other than north-west corner.

There is no practical way to move the pond to a location adjacent to this drain because this is also the highest part of the site.

There is another IDB drain off to the west called Cloot Drove and this currently has an invert of -0.98mOD. It is also the drain to which the site currently drains.

FOUL WATER DISPOSAL

The foul water from the site will be taken to a package treatment plant and the treated effluent will be discharged adjacent to the surface water outfall.

It will be designed and maintained in accordance with the manufacturers recommendations.

Continued

SURFACE WATER DISPOSAL

With the invert of the watercourse adjacent to the proposed pond being -0.44mOD and after including an allowance of 300mm for the discharge outlet above the ditch bed, as well as the gravity pipework and control chamber, the base of the pond would sit at -0.05mOD.

With the existing ground level at the site entrance being +0.95mOD this leaves exactly 1.0m vertical difference between the surface of the road at the entrance and the base of the pond at the back of the site.

Clearly this is insufficient to allow the installation of a traditional piped drainage system.

In order to help gain a little more depth to aid the discharge via gravity, it is proposed to regrade the riparian drain to the north of the field to the west of the site to make it flat at -0.74mOD.

As ditches and watercourses in general are prone to long-term siltation, the outfall invert needs to be elevated at least 300mm from the ditch bed.

Therefore making the same allowance for pipes and controls as explained earlier, this will allow the base of the pond to sit at -0.30mOD which with 1m of attenuated water would make the top water level +0.70mOD or 250mm below the existing ground level at the site entrance.

Still unable to use traditional pipework, even with this small additional fall, it is proposed that all of the site roads and parking on all three phases shall be constructed using permeable blockwork, the sub-base of which can be used to attenuate surface water run-off from the road and roofs along with that being stored in the pond all using one hydro-brake control below the pond.

To aid the transport of flows in the pavement down to the pond, and eventually the outfall, the intention would be to lay perforated concrete pipes below the base of the permeable pavement at a constant invert of -0.30mOD. This would give the pipe at least 1.0m of cover and runoff can be stored in it and the surrounding stone and if it were to reach the maximum storage depth of the pond at +0.70mOD this would still have 90mm additional storage depth available under the road surfacing layers.

To aid maintenance of the underdrain system, catchpit chambers would be located at all changes in direction, and no further apart than 100m.

The discharge rate will be limited to 1.4l/s/ha [21.8l/s] as recommended by the IDB or greenfield runoff [18.8l/s] which can be achieved when using all of the permeable pavement volume along with the pond for the 100yr+40%cc event.

Continued

The pond will be designed to store water at a maximum depth of 1m, as anything more would require additional safety measures, with at least an additional 300mm of freeboard above as protection.

This design will have the added advantage of providing source control to the access road and parking area runoff, help slow and cleanse the flow, and aid with attenuation volumes, before being taken from the sub-base and piped into the downstream pond.

These pavements and open attenuation will all be designed using a 100 year plus 40% climate change event and be tested against FSR and FEH rainfall profiles as required by the LLFA.

In the event of exceedance conditions, when the maximum design storm has been attenuated and the freeboard taken up, the pond will be designed to safely allow the overflow to overtop the bank and enter the adjacent open drainage network.

Continued

MAINTENANCE STRATEGY

Maintenance Responsibility

1. All areas of private access roads, lighting, drainage, and planting will be maintained by a Management Company.

2. The existing watercourse to the East of the site will continue to be maintained by the IDB.

3. All other open watercourses are to be maintained by the Management Company or riparian owner in accordance with notes on Receiving Ordinary Watercourse.

Recommended Private Area Maintenance Requirements

Access Roads

All access roads are to be swept quarterly to clear leaves and to ensure they are clean, tidy and free from dust and debris.

At times of sweeping, inspections to take place to assess any damage to road, kerbs, lighting etc., and any maintenance carried out to ensure user safety is maintained.

Areas of permeable paving are to be maintained in accordance with CIRIA guidelines.

It should be noted that vacuum sweeping of the blockwork drives should not be carried out unless it is proposed to immediately replace the grit removed from between the blocks.

If grit loss is noticed, this should be topped up with grit to the original specification as soon as practicable.

Continued

General Drainage Areas

A system of regular inspections should be established. Initially these inspections should be carried out in October and March, however, this may be modified to suit observations over time.

Items to be observed and cleared are high levels of grit, leaves and other such detritus along with levels of grit between the blocks.

The main aim of these inspections will be to prevent siltation of the surface water system, which, if allowed to develop will reduce the effectiveness of the system and may, over time, reduce the attenuation volumes provided.

The following elements should be inspected and cleaned as part of this preventative routine:

Chambers, particularly catchpits

Headwalls and control chamber

Landscape

Generally, pond areas and watercourses are to be cut and maintained regularly so that grass remains reasonably short, chambers and headwalls to be kept free of silt and debris at all times. Maintenance of the pond is NOT to be carried out if the depth of standing water in the main channel exceeds 300mm.

Please refer to schedules below.

Additional Maintenance Requirements

It is recommended that the 'Bag it and Bin it' leaflet is posted in all toilet areas to help ensure unsuitable items are not flushed into the foul drainage system.

Operation and Maintenance Requirements for Permeable Pavements [CIRIA]

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Operation and Maintenance Requirements for Swales and Ponds

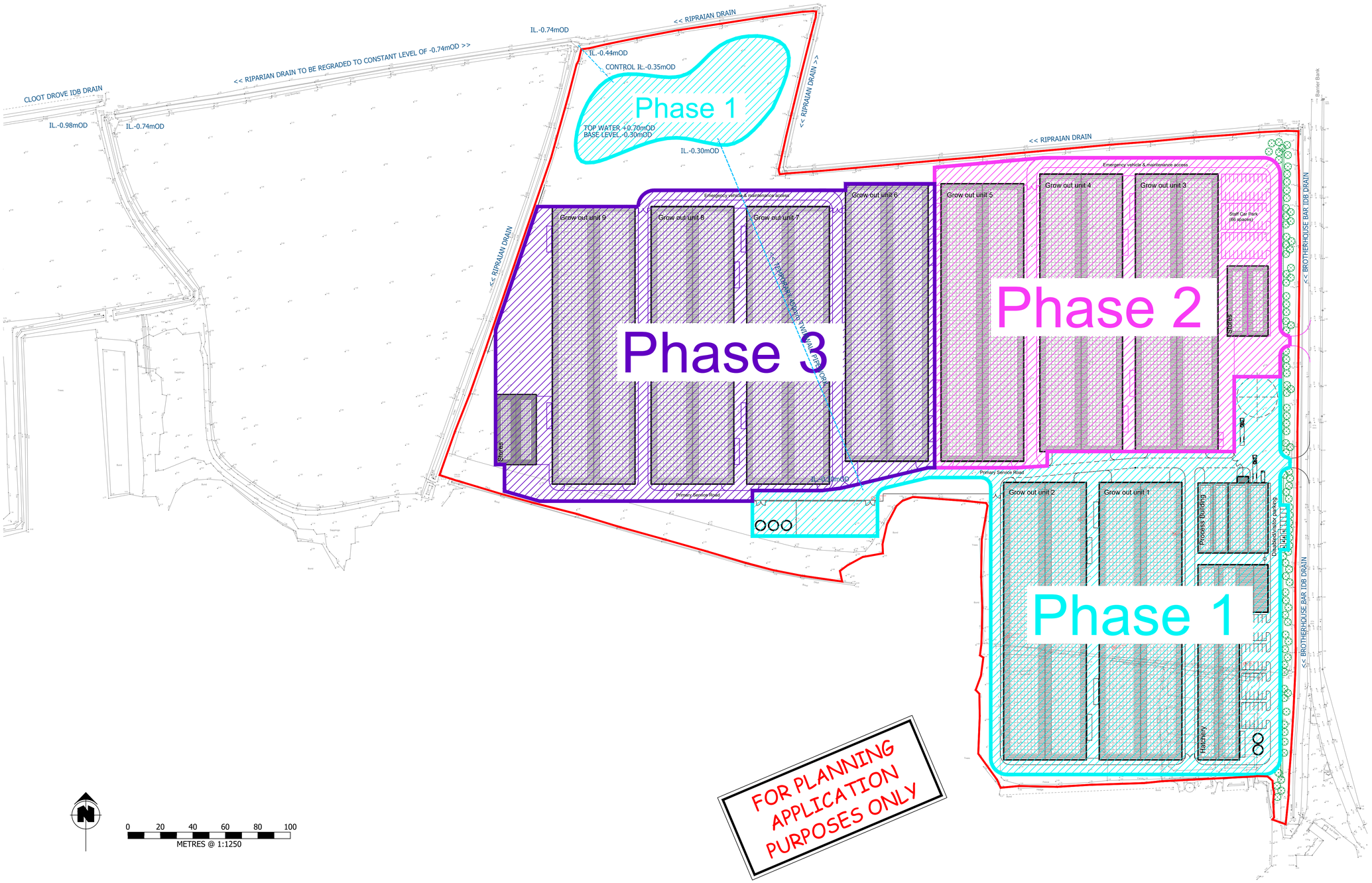
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly or as required
	Cut/strim wet swales to retain grass height 100 -150mm min cut	Bi-monthly
	Manage other vegetation and remove nuisance plants	Bi-monthly
	Inspect discharge pipes, headwalls and orifice plate and control weir for blockages, clear if required	Monthly
	Inspect infiltration surface for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	When required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years then half yearly
Occasional Maintenance	Reseed areas of poor vegetation on growth, after plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial Actions	Repair erosion or other damage by re-turfing or re-seeding	As required
	Re-level uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove and dispose of oil residues using safe standard practices	As required

Operation and Maintenance Requirements for Receiving Ordinary Watercourse

Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Walkover inspection of receiving ordinary watercourse	6 monthly (or as required)
	Maintenance dredge the receiving ordinary watercourse from the Control headwall Weir to the confluence with the main channel to remove silt build up and restore design bed level	First maintenance dredge on completion of SuDS swales and then 5 yearly (or as required)

9033-107-1 DRAINAGE STRATEGY PLAN PHASES 1 - 3

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.



FOR PLANNING APPLICATION PURPOSES ONLY

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METRES @ 1:1250

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

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	Date	Revisions

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Job Title

Proposed Commercial Development
Decoy Farm, Spalding Road,
Crowland, Lincolnshire
PE6 0LU
Staff Car Park
(44 spaces)

Drawing Title

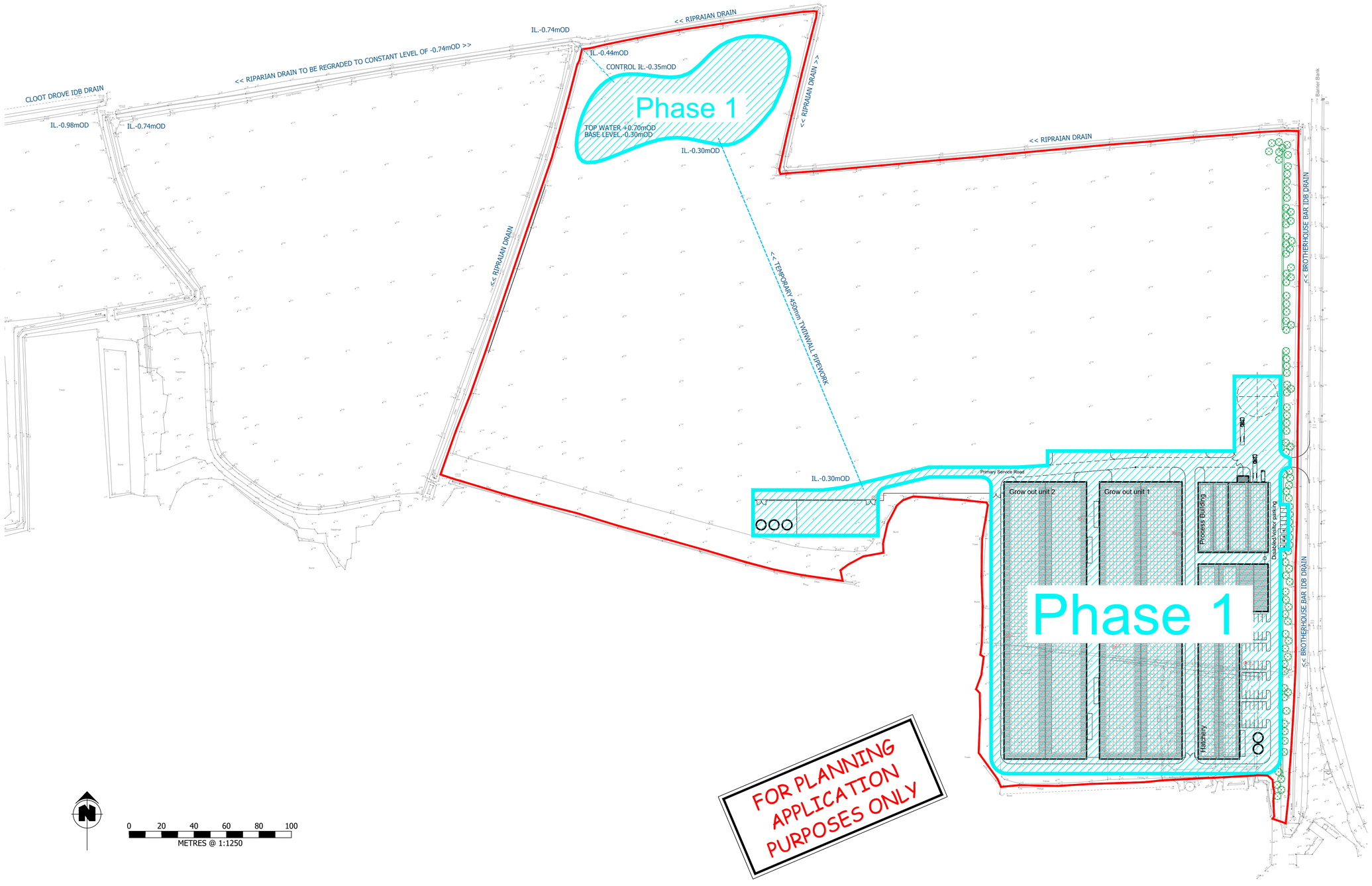
Drainage Strategy Plan
Phase 1-3

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

Drg.No.	Rev.
9033-107-1	-

9033-107-2 DRAINAGE STRATEGY PLAN PHASE 1

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Phase 1

Date	Scale @ A1	Drawn
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9033-107-2	-

‘Bag it and Bin It’ Leaflet

DO NOT FLUSH IT, BAG IT AND BIN IT



Pet Faeces



Paint



Engine Oil



Bandages





Rags



Cotton Wool



Cooking Fat



Condoms



Kitchen Waste



Medicines



Nappies/incontinence products



Needles



Razor Blades