

**Richard Jackson**  
Engineering Consultants

## DRAINAGE DESIGN STATEMENT

Broad Oak Farm, Sturry

BDW Kent

January 2022

Project no: 61109 - Revision C

## Document Review Sheet: -

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Date: - September 2022

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Date: - September 2022

### Document Status

DRAFT

FINAL

### Revision Status

Issue	Date	Description	Prepared	Checked	Approved
1	21.07.21	First Issue	KRT	JJT	KRT
A	29.09.21	Revised for updated layout	KRT	JJT	KRT
B	14.10.21	Basins updated to suit PTP Layout	KRT	JJT	KRT
C	18.02.22	Updated to suit layout changes and Nutrient Neutrality requirements.	KRT	JJT	KRT

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 Project: Broad Oak Farm, Sturry  
 Client: BDW Kent  
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## **1. INTRODUCTION**

- 1.1. Richard Jackson Limited (RJL) were appointed to develop the detailed engineering designs for the proposed residential development at Broad Oak, Sturry, Canterbury which is being developed by BDW Kent. The scheme comprises 456 residential units which will be delivered under a number of phases. A copy of the current Strategy Plan is attached within the appendices which sets out the proposed phase boundaries.
- 1.2. The site has the benefit of a planning approval under reference CA//18/00868 dated 1st March 2021
- 1.3. The planning submission was accompanied by a Flood Risk Assessment (FRA) and Surface and Foul Water Drainage Strategy prepared by Charles & Associates ref. 13-037-003 Rev D dated February 2019. This approved FRA is understood to have been developed following extensive discussions with the various statutory authorities and included proposals for flow restrictions and several surface water attenuation features with additional treatment areas to assist with the site's requirement to achieve nutrient neutrality for the overall development.
- 1.4. This report sets out to identify the basis of any proposed changes to the detailed design compared to the original drainage strategy.

## **2. SURFACE WATER DRAINAGE**

- 2.1. A copy of the proposed detailed design drawings and design calculations are included within the appendices to this report.
- 2.2. The surface water system broadly follows the original strategy with the key changes being made as follows:
- 2.3. The shape of the basins for the southern network have been modified to suit the available space constraints between the highway and ancient woodland
- 2.4. The southern residential parcel has now been designed to wholly discharge into the existing ditch on the southern boundary but without increasing the flow rate at this discharge point. The original strategy included a swale connection from the south to the north which crossed an existing high

pressure gas main which introduced a maintenance requirement for the proposed swale in the vicinity of the high pressure gas main which introduced an unnecessary risk to future maintenance.

2.4.1. The drainage for the northern network contains basins, swales and constructed wetlands in a similar way to the original strategy but has been combined into a single combined outfall compared to the two separate networks which had been proposed within the drainage strategy. The reason for this was related to the foul drainage proposals and the need to locate the proposed foul treatment plant within the original footprint of Constructed Wetlands E and F (see section on foul drainage below)

2.5. Discussions with the LLFA in January 2022 identified a need to use FEH-13 rainfall data for the proposed calculations in line with current KCC policy. Given that FEH-13 data was calibrated for return periods of 2 years and above and storm durations from 60 minutes upwards it is not possible to model a 1 in 1 year event. Additional 1 in 2 year greenfield results have therefore been added to the table I paragraph 2.6 to allow direct comparison to the proposed design figures. This greenfield flow has been calculated using the same input data as that used in the FRA.

2.6. The FRA identified the need for flow restrictions to match calculated Greenfield Runoff. These figures are given below:

<b>Return Period (Years)</b>	<b>Existing Greenfield Discharge (Northern Catchment) I/s</b>	<b>Existing Greenfield Discharge (Southern Catchment) I/s</b>	<b>Whole Site Existing Greenfield Discharge I/s</b>
1 in 1	44.7	10.4	55.10
<i>1 in 2</i>	<i>46.3</i>	<i>10.8</i>	<i>57.1</i>
QBAR	52.60	12.2	64.8
1 in 30	119.2	27.8	147.0
1 in 100	167.8	39.1	206.9

2.7. The actual proposed discharge flow rates within the approved drainage strategy area as follows:

<b>Return Period (Years)</b>	<b>Drainage Strategy Designed Discharge (Northern Catchment) I/s</b>	<b>Drainage Strategy Discharge (Southern Catchment) I/s</b>	<b>Whole Site Drainage Strategy Discharge I/s</b>
1 in 1	38.1	15.8	53.9
1 in 30	74.4	25.7	100.1
1 in 100 + 20% Climate Change	101.3	31.7	133.0
1 in 100 + 40% Climate Change	111.3	34.1	145.4

2.8. The proposed discharge flowrates as demonstrated by the detailed design calculations are as follows:

<b>Return Period (Years)</b>	<b>Detailed Design Discharge (Northern Catchment) I/s</b>	<b>Detailed Design Discharge (Southern Catchment) I/s</b>	<b>Whole Site Detailed Design Discharge I/s</b>
1 in 2	51.8	10.0	61.8
1 in 30	69.0	18.3	87.3
1 in 100 + 20% Climate Change	72.3	31.0	103.3
1 in 100 + 40% Climate Change	74.7	34.4	109.1

2.9. It should also be noted that the northern design incorporates a proposed flow from the packaged treatment plant of 6.1 litres per second. This is a flow of treated effluent and has been incorporated into the surface water network to suit the requirements of the Nutrient Neutrality calculations. This requirement was discussed with the LLFA in a meeting on 7<sup>th</sup> January 2022 where it was agreed that this would be modelled in the surface water

calculations as a base flow of 6.1 l/s (included in Node 206B) and it was accepted that the allowable greenfield discharge is increased by this amount. It should be noted that prior to this change the treated effluent would have been discharged directly to the existing watercourse without any restriction and thus, overall the flow into the existing ditch is no greater than originally proposed.

- 2.10. Reviewing the figures above, the proposed detailed design flowrates for the whole site show betterment compared to the existing greenfield flows for all rainfall events up to and including the 1 in 100 + 40%. For the 1 in 2 year event this applies following increasing of the permitted discharge by 6.1 litres/second as noted in paragraph 2.9
- 2.11. In addition to the hydraulic design as summarised above and as shown in the calculations in the appendices, it was also necessary to replicate the proposed water quality treatment measures that had been identified within the approved drainage strategy. The basins and porous paving are proposed to be provided in a similar fashion to the approved strategy other than the inclusion of two additional basins for the northern catchment.
- 2.12. Whilst the detailed drainage design of the house drainage has not yet been completed for the entire site, parts of the site have been designed and a copy of the relevant drawings are included within the appendices to confirm the proposed extent of permeable paving. Elsewhere across the site, the location of permeable paving has been confirmed and drawing 61109/H8398/CIV/X/BDW/SK205 has been prepared to identify these proposals and to also indicate the intended drainage routes for the entire site to demonstrate sufficient treatment is being provided for all areas.
- 2.13. Proprietary floating reed beds are also being proposed to assist towards the requirement of nutrient neutrality. The design and specification of these are being provided by a specialist supplier (Biomatrix) and at the time of writing this report these designs were not yet complete, but it is anticipated that their systems will be provided within the proposed constructed wetlands D, E and F.

- 2.14. Given the number of surface water storage features, there are several inlets and outlets to be constructed. To minimise visual impact on the public open space areas these are proposed to be proprietary vegetated headwalls by Rootlok. Icosa Water have confirmed that they are prepared to adopt these headwalls within the proposed Section 104 Adoption Agreement.
- 2.15. Leap Environmental Limited have carried out an assessment of the potential impact of groundwater ingress into the surface water storage areas. A copy of their report is included within the appendices to this report together with their confirmation that the proposed incorporation of a 500mm layer of puddle clay to the base of each storage area will be sufficient to resist ground water ingress. The details for this puddle clay layer are shown on the basin section drawings included within the appendices.
- 2.16. The topography across the site is steeply sloped in places which requires the basins to be "terraced" down the slopes which has been used to incorporate green corridors through the site which serve to provide ecological movement corridors through the site. This introduces the added benefit of multiple water quality treatment opportunities as the water flows through each basin. This does also introduce the need for multiple flow control measures which are achieved by a combination of proprietary Hydro-Brake flow controls and controlled pipe diameters which in turn, inevitably result in associated pipework being surcharged for all rainfall events.
- 2.17. The topography of the site also allows exceedance flows to be directed via the proposed highways towards the surface water basins and away from properties. Floor levels for properties are typically set approximately 150mm above adjacent road level to ensure that exceedance flows will not directly impact the properties. Similar, for the localised flooding identified within the calculations for the extreme design events, the excess water will be directed along the roads to downstream gullies/features and away from properties.



### **3. FOUL WATER DRAINAGE**

- 3.1. The foul drainage proposals within the approved drainage strategy identified a part gravity, part pumped connection with all flows directed offsite into an existing sewer within Herne Bay Road.
- 3.2. This proposal is now out of date as the client has informed us of a restriction imposed during consultation with Natural England which has resulted in a maximum of 79 dwellings permitted to be connected to the existing offsite adoptable foul sewer network in Herne Bay Road. It is further understood that this restriction was not imposed by Southern Water who operate the existing network and who have previously permitted a connection point for the whole development within Herne Bay Road
- 3.3. As a result of this restriction, it is proposed for 79 units from the southern catchment to drain via. a traditional gravity sewer network into the offsite sewer. A Section 106 Sewer Connection Application has been submitted and approved by Southern Water.
- 3.4. The remaining units will be discharged to a proposed foul Private Treatment Plant (PTP) which is subject to detailed design by others. The location of the PTP had been proposed within the northern catchment in the area set aside for the originally proposed pumping station but during design development it was identified that the *Cordon Sanitaire* associated with the PTP could compromise delivery of several residential units resulting in the PTP being relocated partially within the footprint of constructed wetlands E and F. This revised location allows the PTP to be located a greater distance from proposed dwellings.
- 3.5. The outfall from the PTP will be a pumped discharge with the outfall of the treated effluent being directed to Constructed Wetland D to allow the design of these wetlands to contribute further to the nutrient neutrality requirements.
- 3.6. The PTP and it's outfall will be offered for adoption by Icosa Water when their designs have been completed.

#### **4. ANCIENT WOODLAND**

- 4.1. An Ancient Woodland is located adjacent to the southern and part of the western boundaries of the site. The woodland itself does not encroach into the development but a 15m buffer zone does. For full details, reference should be made to the Arboricultural Impact Assessment prepared by Lloyd Bore Ltd.
- 4.2. The detailed drainage design has been developed from the approved drainage strategy within the Flood Risk Assessment dated February 2019 which provides drainage for the site in the form of traditional piped systems and a network of suds drainage basins. The drainage strategy identified a number of drainage features being located within the buffer zone. The detailed design, whilst following the strategy has sought to minimise impact on the buffer zone where possible.
- 4.3. As noted above, the topography across the site is steeply sloped in places which requires the basins to be "terraced" down the slopes with flow controls being used to maximise the storage within each basin, which in turn allows their size to be kept to a minimum. This does introduce the need to link the basins with sewers although these have been minimised as much as possible with the only "structures" being the manholes and inlet/outlet headwalls. Manholes are only provided where they are required to house a flow control device to allow maximisation of the useable attenuation storage within the "terraced" basin system. The use of orifice plates attached directly to the headwall structures was considered but these were not acceptable to Icosa Water who will be adopting and maintaining the drainage system. The access covers for the manholes vary slightly in size depending on the depth of the manhole and the need to provide safe access for future maintenance with the currently proposed access cover sizes being either 600x600mm or 600x1200mm.
- 4.4. Where sewers are required to connect the basins we have located them as far away from the edge of ancient woodland edge as practicable, although still within the buffer zone, whilst also ensuring we minimised the impact on the proposed basins and without having to introduce additional manholes.

- 4.5. Alternatives were considered such as using swales between the basins but their depth would have required earthwork widths similar to the basins in many areas resulting in a wider impact on the buffer zone than the trenching associated with the pipework. This would have also reduced the ability to control the flow of water down through the terraced basins which would have reduced the efficiency of the design and resulted in additional basin areas being required.
- 4.6. Moving the basins out of the buffer zone was also considered but would result in the need to reconfigure the entire development site compared to that approved at the Outline Planning application stage and which would result in a significant reduction in unit numbers to a point where the development would be unlikely to be viable.
- 4.7. Headwalls are required at all inlets and outlets and as noted above, rather than use pre-cast concrete or brick structures we have proposed a form of vegetated headwall to minimise the visual and ecological impact and to reduce the depth of the necessary foundations that would be required for a traditional headwall. An example is as follows:



- 4.8. The outfall from the foul PTP is treated water which is acceptable for discharge to the existing watercourse. As noted in paragraph 2.9 above, the outfall from the PTP has been changed to a pumped rising main with a connection now being made into node 206B.

- 4.9. Current drawings still identify a secondary gravity outfall from the PTP laid within the ancient woodland buffer. Upon completion of the PTP designs it is anticipated that this secondary outfall will be removed or modified to reduce the impact on the ancient woodland buffer but in the meantime the route of the secondary outfall pipe has been based on ensuring maximum distance from the existing woodland edge whilst avoiding interaction with the proposed suds basins. The final requirement for this outfall is subject to confirmation upon completion of the PTP detailed design but if required its depth will be kept as shallow as possible. The manholes access covers for this outfall pipe will all be kept to a minimum size which are likely to be 600x600mm subject to final depth. As the surface water and foul water are both proposed to be adopted by Icosa Water it has been possible to combine the outfall for this secondary outfall into a single headwall structure combined with the northern surface water network's outfall to further minimise impact on the existing vegetation.
- 4.10. All construction work in the vicinity of the ancient woodland buffer will be carried out in accordance with the requirements of the Arboriculturist with an obligation being placed on the main contractor to engage with them to ensure all necessary supervision and control is provided.
- 4.11. The following note has been included on the relevant drainage layout drawings to ensure that the tendering Contractor's make an appropriate allowance to ensure this is carried out.

CONTRACTOR TO ENSURE THEY REFER TO THE ARBORICULTURAL IMPACT ASSESSMENT AND THE ARBORICULTURAL METHOD STATEMENT PREPARED BY LLOYD BORE LTD PRIOR TO UNDERTAKING ANY CONSTRUCTION WORKS TO ENSURE THAT THEY CO-ORDINATE WITH THE ARBORICULTURIST FOR ANY SUPERVISION THAT THEY MAY NEED TO PROVIDE DURING THE WORKS

## **5. OCCUPANTS AND USERS OF THE DEVELOPMENT**

- 5.1. As the site is proposed for residential development there will be more people on the site than at the present time.
- 5.2. The change in use will mean that people will now reside at the site and will sleep overnight. The site layout and surface water drainage system will be designed to cope with events up to the 1.0% annual probability event plus 40% climate change with some minor flooding to be contained within the site in SuDS and attenuation features.

## **6. ADOPTION, MANAGEMENT AND MAINTENANCE**

- 6.1. The main foul and surface water networks will be offered for adoption to Icosa Water with the only exception being the surface water basins which will be maintained by a management company. The previous designs have been technical vetted and approved by Icosa Water and a copy of their approval certificate is attached for information. It will be necessary for them to reassess the current designs as presented in this report but it is not anticipated that the changes that have been made will cause any concerns or issues with the adoption approvals.
- 6.2. The main highways within the development are either traditional (asphalt or block paving) or permeable paving (porous asphalt or block paving). Where the roads are proposed to be adopted by Kent County Council they will be of traditional, and non-permeable construction. Kent County Council will be responsible for maintenance of their aspect of the drainage system (gullies and their connections).
- 6.3. The non-adopted roads (both permeable and impermeable) will be transferred to a management company who will be responsible for their maintenance. Where there are proposed permeable highways, they will be under-drained via a permeable sewer which will be offered to Icosa Water for adoption.
- 6.4. Individual homeowners will be responsible for the maintenance of their individual drainage system such as the inspection chambers around each property, gutters and down pipes and gullies to driveways.

### SuDS Maintenance Plan

Maintenance	Person/Company responsible	Required Action	Frequency
Infiltration basins	Management Company	Remove Litter, debris and trash	Monthly
		Cut grass – for landscape areas and access routes	Monthly (during growing season) or as required
		Cut grass – meadow grass in and around basin	Half yearly: spring (before nesting season) and autumn
		Manage other vegetation and remove nuisance plants	Monthly at the start, then as required
		Reseed areas of poor vegetation growth	Annually or as required
		Prune and trim trees and remove cuttings	As required
		Remove sediment from pre-treatment system when 50% full	As required
		Repair erosion or other damage by reseedling or re-turfing	As required
		Relevel uneven surface surfaces and reinstate design levels	As required
		Inspect banksides, etc. from evidence of physical damage	Monthly
		Inspect inlets, and pre-treatment system for silt accumulation; establish appropriate silt removal frequencies	Half yearly
Infiltration basin - inlets and outlets	Icosa Water	Inspect inlets, outlets including control manholes for blockages, and clear if required	Monthly
		Repair or rehabilitate inlets, outlets and overflow	As required
		Inspect structures, pipework etc. from evidence of physical damage	Monthly
Road Gullies & Gully Connection	Kent County Council (Once adopted)	Maintenance schedules to be covered by KCC	N/A
Foul Water Sewers & manholes	Icosa Water (Once adopted)	Maintenance schedules to be covered by Icosa Water	N/A
Surface Water Sewers & manholes	Icosa Water (Once adopted)	Maintenance schedules to be covered by Icosa Water	N/A

Shared permeable paving	Management Company	Trimming any roots that may be causing blockages	Annually (or as required)
		Reconstruct permeable paving and/or replace or clean void fill if performance deteriorates or failure occurs	As required
		Replacement of clogged geotextile (will require reconstruction of permeable pavement)	As required
		Inspect silt traps and note rate of sediment accumulation	Monthly in the first year then annually
		Check Permeable Paving to ensure emptying is occurring	Annually
		Brushing and vacuuming (standard cosmetic sweep over the whole surface)	Three times per year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations. Pay particular attention to areas where water runs onto a pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
		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
Private drainage	Homeowners	Monitor inspection chambers.	Annually – or as required
		Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspection)
		Monitor inspection chambers and gullies	Annually – or as required

NOTE 1: The drainage features are to be maintained as detailed above to ensure hydraulic performance. The schedule has been produced in accordance with the CIRIA SuDS Manual (C753) and will be undertaken by the relevant parties.

NOTE 2: Homeowners are to be made aware of shared drainage features and their joint responsibility to maintain the drainage.

## **7. HEALTH AND SAFETY**

- 7.1. The site has been designed with the health and safety of the future occupants in mind. The infiltration basins have been designed to the principle of maintaining side slopes no steeper than 1:3 albeit there are limited, localised areas of 1:2 to reduce the extent of excavation and impact within the woodland buffer. In the areas where the steeper 1:2 slopes are used, they are only in partial use within any given basin and thus all basins have areas of slopes no steeper than 1:3 to assist egress if necessary. The maximum attenuation storage water depth of the basins is 1.2m in constructed wetland D with all others having a maximum depth of 1.0m.
- 7.2. The size of the basin inlet and outlet pipework has been minimized (subject to hydraulic requirements) to deter unauthorized entry. Where these are larger the design of the headwalls will include an appropriate method to restrict access.
- 7.3. Barratt David Wilson actively encourage design of safe Sustainable Drainage and provide a bespoke risk assessment form which is required to be reviewed and completed during the design process of any Sustainable Drainage proposals on their developments. A copy of this form is attached in the appendices to this report.



<b>Drainage Activity</b>	<b>Identified Risks</b>	<b>Identified Hazard</b>	<b>Who Could Be Harmed?</b>	<b>Suggested Risk Reduction Actions</b>	<b>Suggested Actions to Be Completed by Who?</b>
Sewers (Foul and Surface water)	Falling into the trench, structural collapse, object failing. Workers crushed by moving loads or equipment.	Trench excavation, lifting operations	<ul style="list-style-type: none"> <li>- Construction personnel.</li> <li>- Site Visitors.</li> </ul>	<ul style="list-style-type: none"> <li>- Inform via notes on design drawings</li> <li>- Depth of sewer kept to a minimum where possible.</li> <li>- Pipe diameter kept to a minimum</li> <li>- Ground investigation</li> <li>- Onsite contractors to undertake their risk assessment and method statement</li> </ul>	<ul style="list-style-type: none"> <li>- Designers</li> <li>- Contractors</li> </ul>
Lifting manhole covers / Jetting manholes	Falling into the manhole, injury from lifting, injury	Weight of manhole cover and equipment, depth of manhole, vehicles.	<ul style="list-style-type: none"> <li>- Construction personnel.</li> <li>- Site Visitors.</li> <li>- Surveyors</li> </ul>	<ul style="list-style-type: none"> <li>- Depth of sewer kept to a minimum where possible in designs.</li> <li>- Onsite contractors to undertake their risk assessment and method statement.</li> </ul>	<ul style="list-style-type: none"> <li>- Designers</li> <li>- Contractors</li> </ul>
Surface Water Basin	Drowning, slipping	Water, Uneven surface	<ul style="list-style-type: none"> <li>- Construction personnel.</li> <li>- Site Visitors.</li> <li>- General Public.</li> </ul>	<ul style="list-style-type: none"> <li>- Depth of drainage features to be kept to a minimum where possible in design.</li> <li>- Basin to be sited in a location with good surveillance.</li> <li>- Side slopes to be no steeper than 1 in 3.</li> </ul>	<ul style="list-style-type: none"> <li>- Designers</li> </ul>

## **Appendix A**

### Strategy Plan Identifying Phasing

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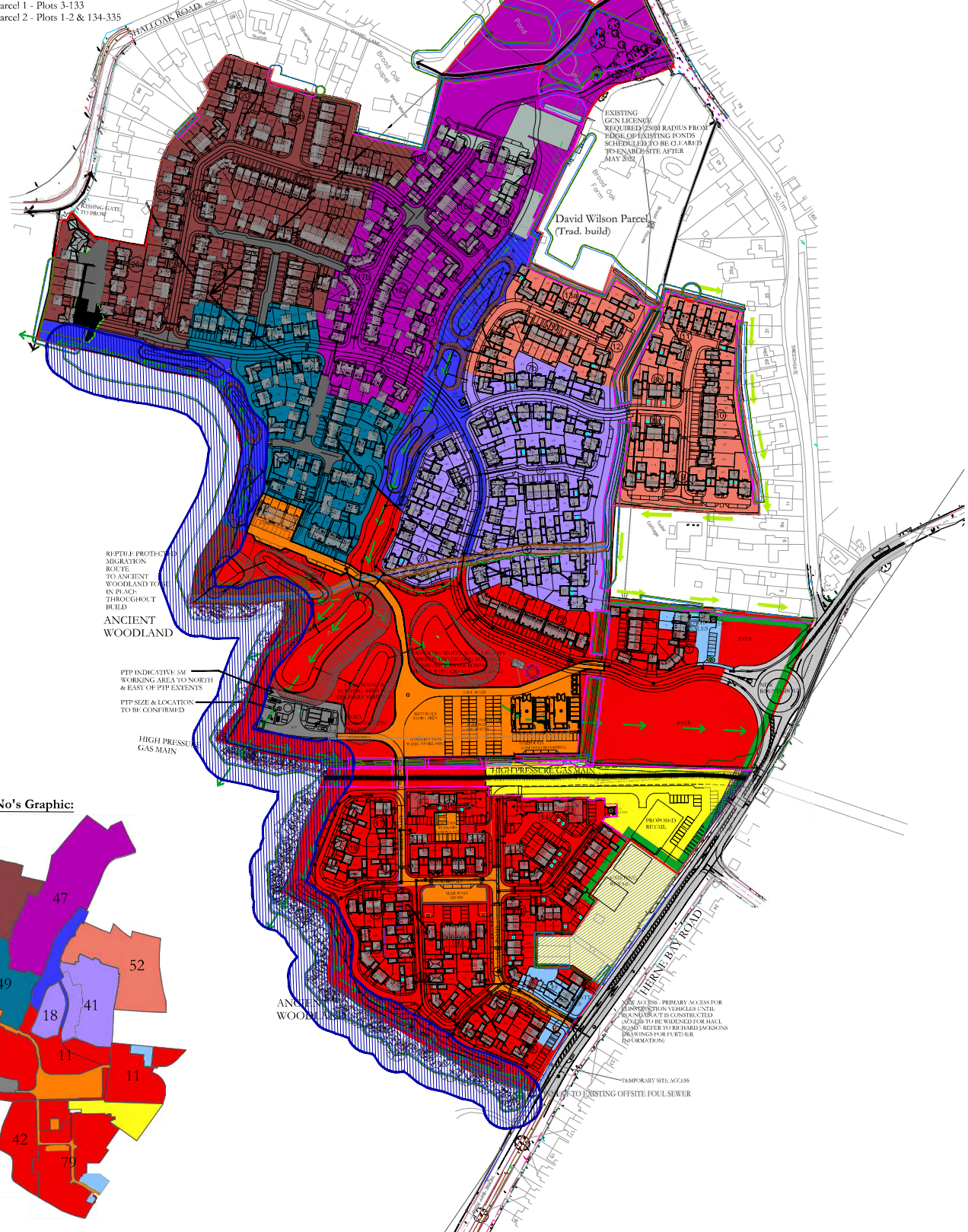
Title: DRAINAGE DESIGN STATEMENT  
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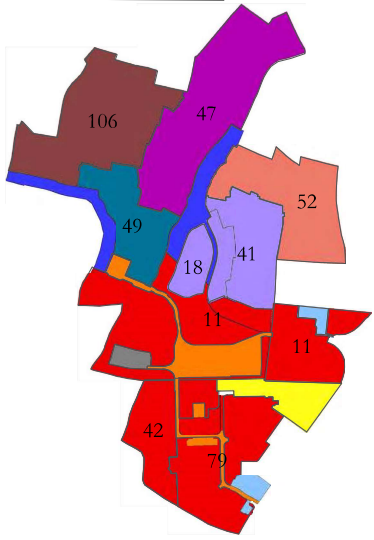
- KEY:**
- PHASE 1 - 143 PLOTS INCL. SALES ARENA (79 PLOTS GRAVITY DRAINAGE)
  - RETAIL LAND & RIGHT OF ACCESS
  - RETAIL LAND TO BE TRANSFERRED TO HIGHWAYS
  - PHASE 2 - ECOLOGY CORRIDOR @ PLOTS
  - BUILD ROUTE
  - FRUIT PICKERS ACCESS
  - SALES ARENA
  - RELOCATE PTP + CRATCH BUND (OMIT PUMP STATION) (INCLUDES SM WORKING AREA TO NORTH & EAST)
  - S278 WORKS
  - COMPOUND & HAUL ROAD
  - 2.4M HIGH HOARDING TO COMPOUND
  - 15M ANCHOR WOODLAND BUFFER LINE
  - DEMOLITION
  - FURTHER SURVEY WORK
  - PHASE 3 - 50 PLOTS (202)
  - PHASE 4 - 52 PLOTS (254)
  - PHASE 5 - 47 PLOTS (501)
  - PHASE 6 - 106 PLOTS - (407)
  - PHASE 7 - 49 PLOTS - (456)
  - PROW TEMP
  - PROW CURRIENT
  - 2.4M HIGH HOARDING TO PROW DIVERSION
  - REPTILE RECEPTOR AREA
  - ECOLOGY CORRIDOR (PRE-CONSTRUCTION)
  - HERAS FENCING TO PERIMETER OF HIGH PRESSURE GAS MAIN EASEMENT (6M EITHER SIDE, ACCESS 100)
  - THIS AREA TO BE PRE-AGREED WITH SITE TEAM
  - EXISTING WATER PIPE & EASEMENT
  - EXISTING WATER PIPE TO BE REMOVED
  - PROPOSED WATER PIPE / GAS EASEMENT TO BE CONFIRMED ONG.U. UTILITY DESIGNS COMPLETE D
  - TEMPORARY HERAS FENCING TO GAS BRIDGE - TO REMAIN IN PLACE UNTIL BRIDGE DESIGN IS APPROVED & BUILT.
  - VEGETATION CLEARANCE

H8400 - Barratt Parcel - Plots 336-456  
 H8399 - David Wilson Parcel 1 - Plots 3-133  
 H8401 - David Wilson Parcel 2 - Plots 1-2 & 134-335

# BROAK OAK



**Phase/Plot No's Graphic:**



Rev	Date	By	App'd	Description	Rev	Date	By	App'd	Description	Rev	Date	By	App'd	Description
1	15/02/21			Complete layout updated to suit client comments (DVI & Barratt given separate compounds, parking removed, southern boundary extended & additional row of parking added). Groundwater contour amended to extend to stem. Prow to western contour moved into Phase 2. 25/11/2021	1	15/02/21			PPTP position updated to suit client comments (DVI & Barratt given separate compounds, parking removed, southern boundary extended & additional row of parking added). Groundwater contour amended to extend to stem. Prow to western contour moved into Phase 2. 25/11/2021	1	15/02/21			PPTP position updated to suit client comments (DVI & Barratt given separate compounds, parking removed, southern boundary extended & additional row of parking added). Groundwater contour amended to extend to stem. Prow to western contour moved into Phase 2. 25/11/2021
2	15/02/21			Drawings (basins updated) in line with engineers designs. Headflow amended to suit storage basins. PTP layout & working area added. 25/11/2021	2	15/02/21			Drawings (basins updated) in line with engineers designs. Headflow amended to suit storage basins. PTP layout & working area added. 25/11/2021	2	15/02/21			Drawings (basins updated) in line with engineers designs. Headflow amended to suit storage basins. PTP layout & working area added. 25/11/2021
3	15/02/21			Compound layout updated to suit client comments (compound moved & orientation amended to allow for PTP access - parking updated to suit). Groundwater contour amended. 25/11/2021	3	15/02/21			Compound layout updated to suit client comments (compound moved & orientation amended to allow for PTP access - parking updated to suit). Groundwater contour amended. 25/11/2021	3	15/02/21			Compound layout updated to suit client comments (compound moved & orientation amended to allow for PTP access - parking updated to suit). Groundwater contour amended. 25/11/2021
4	25/11/2021			Temporary access indicated as per client instruction.	4	25/11/2021			Temporary access indicated as per client instruction.	4	25/11/2021			Temporary access indicated as per client instruction.

**A1**

**THE NOBLE CONSULTANCY**

Residential Residential Architecture

**STRATEGY PLAN**

The Noble Consultancy Ltd  
 The Station, Stone Cross Farm,  
 Badminton Road, Frampton Cotterell  
 South Gloucestershire, BS30 2BY

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Client: **BDW KENT**

Project: **BROAK OAK FARM, STURRY**

Scale: 1:1250 Date: MAY 2021 Drawn: NMT

Job No: 1345 Draw No: 0002 Rev: Q

## **Appendix B**

General Arrangement Drawings  
S104 Adoption Layout  
Surface Water Basin and Constructed Wetland Sections  
Private Drainage General Arrangement Drawings (for extent of phase 1  
groundworks)  
Whole Site Drainage Layout & Permeable Paving Locations