



Cala Homes South Homes Counties

LAND AT WESTERGATE, WEST SUSSEX

Drainage Impact Assessment



LAW-WSP-XX-XX-C-RP-00003

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ARUN DISTRICT COUNCIL

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1 INTRODUCTION

1.1 APPOINTMENT AND BRIEF

- 1.1.1. This report was commissioned by Cala Homes (South Home Counties) as part of the supporting documentation for an Hybrid Application 1) Full Planning Application for western section of East/West Link Road with new access, road bridge & associated works; 2) Outline Planning Application with all matters reserved for up to 400 No. dwellings with access & associated works at land to the east of Westergate, West Sussex and prepare a Foul Drainage Strategy and Drainage Impact Assessment.

1.2 BACKGROUND

- 1.2.1. Historically questions have been raised regarding the capacity of the existing Southern Water foul sewerage system and the Lidsey Waste Water Treatment Works (WTW) as a result of sewerage flooding of roads and property that has taken place in the Lidsey WTW catchment, including areas of Barnham and Westergate.
- 1.2.2. Arun District Council (ADC)'s Local Plan 2011-2031 states that this flood risk is assumed to be caused by groundwater infiltration and surface water inundation of the sewerage system.
- 1.2.3. West Sussex County Council, in partnership with Southern Water, Arun District Council, the Environment Agency and Local Groups, has undertaken a Surface Water Management Plan (SWMP)¹ for the Lidsey WWTW catchment area, in order to identify the key reasons for these events and to identify measures to help reduce or resolve them. The SWMP was published in October 2014.
- 1.2.4. Arun District Council (ADC)'s Local Plan 2011-2031 policy W DM1 (3) requires that any Major Development in the Lidsey WTW catchment must be accompanied by a Drainage Impact Assessment, which takes account of surface water and foul water disposal.
- 1.2.5. The Application Site is located within the drainage catchment of Lidsey WTW (Refer to map in Appendix C).

¹ Lidsey SWMP (2014), *Lidsey Surface Water Management Plan*, West Sussex County Council, Atkins

2 EXISTING SITE

2.1 SITE LOCATION

- 2.1.1. The Application Site is situated to the east of Westergate Street in West Sussex. The Ordnance Survey Grid Reference for the site is 494017, 104879 and the nearest post code is PO20 3QR.
- 2.1.2. The Site is bordered to the east by the Lidsey Rife, a water course that runs along the boundary and open land. To the west and north the site is bordered by a residential area and along the southern boundary of the site runs a railway line, beyond which there is open land. Refer to the Site Location Plans in Appendix A.

2.2 SITE DESCRIPTION

- 2.2.1. The Application Site has previously been used for arable agriculture. The site is surrounded by trees and hedgerows. There are also several hedgerows that cross the site.
- 2.2.2. Table 1 describes the Application Site's general characteristics.

Table 1 – Application Site's general characteristics

Characteristic	Description
Area	Approximately 19.23 ha
General Topography	Cole & Cole Ltd completed a topographical survey of the Site in June 2016. The topographical survey indicates that levels range from approximately 9.8m Above Ordnance Datum (AOD) to approximately 1.9mAOD. The Topographical Survey indicates that the north part of the Application Site slopes from north west to the south east providing a level difference of approximately 6.5m across the north part of the Site. The south part of the Application Site slopes from south west to the north east providing a level difference of approximately 6m across the south part of the Site. Refer to Appendix B for the Cole & Cole Ltd Topographical Survey - Drawing number: 16-0102a-Rev C (unspecified date). Ground levels on the survey undertaken by Cole & Cole Ltd have not been independently verified by WSP.
Existing Surfacing	Greenfield
Current Use	Vacant open space
Boundaries	North Residential Development
	South Railway Track / Green Open Space
	East Watercourse / Green Open Space
	West Residential Development
Access	Access to the Application Site is via Westergate Street



2.3 EXISTING DRAINAGE

SURFACE WATER

- 2.3.1. The Application Site drains to the Lidsey Rife on the eastern boundary via a series of on-site ditches, some of which also carry flow from existing development to the west. For more detail refer to WSP's Flood Risk Assessment (FRA), 2023.
- 2.3.2. Record plans received from Southern Water (Appendix C) indicate that a 675mm diameter surface water sewer crosses the north-eastern corner of the site prior to discharging to the Lidsey Rife and associated manholes exist within the vicinity and within the Application Site boundary.

FOUL DRAINAGE

- 2.3.3. There are no existing buildings on the Application Site and no existing foul discharge generated.
- 2.3.4. Record plans received from Southern Water (Appendix C) indicate that two foul sewers cross the Application Site from west to east and one foul sewer is located within the eastern boundary draining from north to south. All the foul sewers that cross the Application Site connect before leaving the Site in the south eastern corner, crossing the Lidsey Rife and the railway line to the south. This sewer continues south to connect to the Lidsey WTW.
- 2.3.5. A number of the existing foul manholes are also identified on the Topographical Survey (Appendix B).
- 2.3.6. The foul sewer that crosses the northern part of the Application Site from west to east is identified as a 150mm diameter vitrified clay sewer and connects to a 300mm diameter vitrified clay sewer that runs within the eastern boundary towards the south.
- 2.3.7. The second foul sewer that crosses the Application Site from the west is identified as a 300mm diameter vitrified clay pipe and also connects with the sewer that runs within the eastern boundary. After this connection point the main north-south sewer changes to a 375mm diameter pre-cast concrete pipe.

3 DEVELOPMENT PROPOSALS

3.1 PROPOSED DEVELOPMENT

- 3.1.1. The Application Site covers approximately 19.35 hectares (ha) and would provide up to 400 new residential dwellings (see Appendix D for an illustrative layout of the proposed development). A single vehicular access onto Westergate Street via Pine Close is proposed. The Site forms part of Strategic Site SD5 allocated under policy H SP1 of the ADC Local Plan, and proposals include a highway link to the wider allocated site via a new bridge over the Lidsey Rife.
- 3.1.2. The proposed development will include mixed size dwellings with gardens and associated new vehicular and pedestrian accesses, estate roads, parking, footpaths/cycleways, public open space and landscaping.
- 3.1.3. The proposed development site is located in the catchment of the Lidsey Waste Water Treatment Works (WWTW) and Southern Water are the statutory sewerage undertaker.

4 POLICY

4.1 CONSULTATION

- 4.1.1. Consultation has been undertaken with Southern Water (the statutory sewerage undertaker) during the preparation of this assessment. Refer to Appendix C for correspondence.
- 4.1.2. Southern Water has advised (July 2023) that 50 dwellings can be accommodated within the existing network without the need for network reinforcement, with a Point of Connection to manhole SU94042401, in the south-east of the site.
- 4.1.3. Southern Water has also confirmed that there is capacity at the Lidsey WTW for the development. The WTW is the nearest point of connection where capacity for the whole development is currently available and Southern Water has advised that network reinforcement works would be required to cater for the proposed development. The WTW is located approximately 1km southeast of the site.
- 4.1.4. Southern Water has also advised that a solution for the whole site would be provided via a detailed assessment once planning permission has been granted.

4.2 POLICY AND GUIDANCE

This report has been informed by and makes reference, where appropriate, to the following documents and policies:

- ✧ The NPPF; Department for Levelling Up, Housing & Communities (2023);
- ✧ The NPPF Flood Risk and Coastal Change PPG; Department for Levelling Up, Housing & Communities (2022);
- ✧ Flood Risk Assessments: Climate Change Allowances; Environment Agency (2022);
- ✧ Non-Statutory Technical Standards for Sustainable Drainage Systems; DEFRA (2015);
- ✧ Building Regulations Approved Document H; Ministry of Housing, Communities & Local Government (2015);
- ✧ The SuDS Manual (CIRIA C753); CIRIA (2015);
- ✧ Design and Construction Guidance; Water UK (2021);
- ✧ West Sussex Strategic Flood Risk Assessment (January, 2010);
- ✧ West Sussex Preliminary Flood Risk Assessment (May, 2011);
- ✧ West Sussex local flood risk management strategy (October, 2014);
- ✧ Arun and Western Streams Catchment Flood Management Plan (December, 2009);
- ✧ Lidsey Surface Water Management Plan (October 2014);
- ✧ Arun Strategic Surface Water Management Study (October 2016);
- ✧ Arun District Strategic Flood Risk Assessment (November, 2016);
- ✧ Adopted Arun Local Plan 2011-2031 Publication (July 2018);
- ✧ Arun District Council Infrastructure Capacity Study and Delivery Plan draft report (2016);
- ✧ Arun District Council Local Plan – Memorandum of Understanding: Sewerage capacity (and treatment) (September 2017);
- ✧ Aldingbourne Neighbourhood Development Plan (2019-2031) (June 2021);
- ✧ The Flood Risk Implications of Strategic Development at Barnham / Eastergate / Westergate - Richard Allitt Associates Ltd (April 2014);
- ✧ Southern Water Drainage & Wastewater Management Plan (May 2023).

4.3 LIDSEY SURFACE WATER MANAGEMENT PLAN (OCTOBER 2014)

- 4.3.1. The Lidsey Surface Water Management Plan (SWMP) was led by West Sussex County Council as part of its role as the Lead Local Flood Authority and was jointly funded by Southern Water.
- 4.3.2. The purpose of the SWMP is to evaluate flood risk from various sources of flooding and develop an agreed “Action Plan” to reduce or mitigate current and future flood risk, by bringing together primary stakeholders to share data and expertise. An evidence base of historical flooding is provided within the SWMP. The plan was created to cover the Lidsey Sewage Treatment Works catchment and also the areas of Middleton, Elmer and Slindon as well as Westergate.
- 4.3.3. Amongst other proposals, to reduce flood risk, the Lidsey SWMP identifies the need for measures to reduce ingress of surface water and ground water into the existing foul sewer network. These measures were anticipated to principally involve lining of existing sewers. Southern Water previously confirmed that identified works to reduce infiltration had been completed.
- 4.3.4. The proposed Barnham Eastergate Westergate allocation site (now allocated site SD5) has been identified within the SWMP study.
- 4.3.5. Lidsey WTW is located south of Westergate and receives flows from three different sources in total. A 450mm diameter gravity sewer from Westergate connects with a 600mm inlet sewer, which flows to the terminal pumping station within the WTW compound.
- 4.3.6. The SWMP reports that groundwater flooding has been reported in several locations including Westergate.
- 4.3.7. Groundwater as well as surface water was found to be entering a number of manhole chambers around the areas of Eastergate, Westergate and Barnham. The closest manhole to the Application Site that was recommended in the SWMP to be repaired is manhole SU93049703 on Elm Croft Place, Westergate.
- 4.3.8. According to the SWMP Westergate is characterised as an area with “Low Risk” of Fluvial and Groundwater flooding, “Medium Risk” of Pluvial (surface water) flooding and “High Risk” of Public Sewer flooding. Hydraulic overload of sewers was reported in Oak Tree Lane on 02/01/2013 and on Westergate Street on 29/01/2013 and 09/11/2010.
- 4.3.9. The SWMP follows the NPPF policy and states that if Greenfield sites are going to be developed it has to be ensured that the discharge rates are limited to current Greenfield runoff rates and discharge is to watercourse and/or ground, where infiltration is viable.

4.4 SOUTHERN WATER DRAINAGE AND WASTEWATER MANAGEMENT PLAN (DWMP) (MAY 2023)

- 4.4.1. Southern Water published its first Drainage and Wastewater Management Plan (DWMP) for submission to Ofwat in May 2023.
- 4.4.2. Under Section 94A of the Water Industry Act (1991), added by Section 79 of the Environment Act (2021), water companies are required to produce one regional DWMP for their operating area based on the plans for each River Basin Catchment and the drainage and wastewater systems within these. Lidsey WWTW is located within the Arun and Western Streams catchment.

4.4.3. For each River Basin Catchment the DWMP is developed through a series of stages:

- 1 Risk based catchment screening
- 2 Baseline Risk and Vulnerability Assessment (BRAVA)
- 3 Problem Characterisation
- 4 Options development and appraisal
- 5 Programme Appraisal
- 6 Consultation

4.4.4. The results of each stage of work for each river catchment are published on-line on Southern Water's website <https://www.southernwater.co.uk/dwmp/arun-and-western-streams-catchment>

4.4.5. Lidsey is one of fifty-three WTW catchments that were identified as having a potential risk / vulnerability and were progressed to the BRAVA stage.

BASELINE RISK AND VULNERABILITY ASSESSMENT (BRAVA)

4.4.6. Southern Water summarise:

"The output of the BRAVA shows:

- the current risks and issues in each sewer catchment within the Arun and Western Streams catchment – providing a baseline to assess future risks against
- how those risks may change in future, and when they may change
- the primary drivers behind the future changes in risk including:
 - a deterioration in the performance of our sewerage systems.
 - climate change – including the increasing frequency and severity of droughts and storms.
 - customer behaviour – including issues such as sewer blockages or use of environmentally degrading materials such as chemicals, pesticides, and plastics.
 - growth and urban creep.
 - a combination of any or all of these that are relevant in the catchment being assessed".

4.4.7. The BRAVA considers 14 different planning objectives, the drivers for particular risks within the catchment, and whether the risk to each planning objective is either:

- ⌘ Not applicable
- ⌘ Not Significant
- ⌘ Moderately Significant
- ⌘ Very Significant

This is assessed for 2020 and where relevant, the risk is also assessed for 2050 taking account of predicted growth within the catchment.

4.4.8. For the Lidsey WwTW catchment:

- ⌘ Population is expected to increase by 58% from 21,708 (2020) to 34,299 (2050).
- ⌘ 8 out of 14 planning objectives are identified as having either a Moderately Significant or Very Significant risk. These are generally identified as driven by hydraulic or water quality requirements.
- ⌘ The BRAVA proposes an "improve" investment strategy for the catchment, with a "Medium" level of concern. This is therefore included within the catchments taken forward to the Problem Characterisation Stage.
- ⌘ Planning Objective 8 "Dry Weather Flow Compliance" is identified as a Moderately Significant risk for 2020 with it predicted to increase to Very Significant in 2050, meaning that spare capacity is currently between 0-20% and is at risk of being exceeded in 2050 without works to increase



capacity (as set out in Southern Water's DWMP Summary of the methodology for the Baseline Risk and Vulnerability Assessment (BRAVA) on Wastewater Treatment Works Dry Weather Flow Compliance).

PROBLEM CHARACTERISATION

- 4.4.9. This stage of the DWMP "uses the results from the Baseline Risk and Vulnerability Assessment (BRAVA) to explore the causes of risks and the primary drivers".
- 4.4.10. The impact of rainfall / surface water runoff on the performance and capacity of the existing sewerage network is identified for a number of planning objectives. Groundwater infiltration is also identified as contributing to flows within the existing sewer network.
- 4.4.11. For Planning Objective 8 - Dry Weather Flow Compliance, the Problem Characterisation results include a figure showing that predicted Dry Weather Flow (DWF) is expected to increase significantly from 2020 with a risk that without intervention the existing permit limit of 5833m³/day could be exceeded around 2025.

OPTIONS DEVELOPMENT AND APPRAISAL

- 4.4.12. In this stage of the DWMP generic options were first screened (August 2021) to identify the types of options that are most appropriate to improve system performance within a catchment.
- 4.4.13. Identified investment needs for the Lidsey WTW catchment are set out in the DWMP Investment Needs document (May 2023). This identifies nineteen preferred options to improve the performance of the Lidsey WTW catchment with indicative costs and timescales identified for each option. Seven of the preferred options identify works to be carried out in the AMP8 period (2025 – 2030). These include:
 - LIDS.WINEP01.1 – Works to reduce the impact from storm spills from Lidsey SSO.
 - LIDS.PW01.3 – Enhanced sewer maintenance in Barnham and Westergate to reduce the number of blockages.
 - LIDS.OT01.5 – Works to improve the hydraulic model to improve confidence and accuracy.
 - LIDS.WINEP.P02.2 – Action to reduce nutrient discharge .
 - LIDS.WINEP.P02.2 – Optimisation of existing assets to achieve 14mg/l BOD.
- 4.4.14. Further work to increase capacity to allow for planned new developments and a wider growth scheme for the Lidsey catchment are identified as necessary in the AMP9 (2030 to 2035) and AMP10 (2035 to 2040) periods respectively.

5 PROPOSED DRAINAGE STRATEGY

5.1 ANTICIPATED FOUL FLOWS

- 5.1.1. Based on the guidance in Design and Construction Guidance², a peak design flow of 4000 l/dwelling/day for the proposed development would be expected to produce approximately 18.5l/s of wastewater at peak flow.
- 5.1.2. However, as the number of homes increases the probability of all discharging peak flow at the same time reduces. Recent experience with Southern Water has highlighted that a reduced peaking factor is considered more realistic for new developments of this size. This method is based on a consumption of 125l/h/d with an occupancy rate of 2.4 person/dwelling using 10% infiltration and a DWF of 2.5. Using this approach gives the values for peak flows of:
- ※ 3.61 l/s for all 400 homes
- 5.1.3. The existing on-site 375mm diameter Southern Water sewer has a minimum gradient of 1:229 between manhole 2401 and 3301. Based on hydraulic pipe tables this is estimated to have an unsurcharged capacity of 117l/s.

5.2 FOUL DRAINAGE STRATEGY

- 5.2.1. As there is an existing foul sewer on site of suitable size for a Point of Connection the starting point for a proposed drainage strategy is to connect by gravity to the existing sewers. If downstream reinforcement is required to increase capacity the developer contributes to this financially via the per plot Infrastructure Charge, in line with Annex A2 of Ofwat's Charging Rules for New Connections, effective April 2023.
- 5.2.2. Southern Water has advised (July 2023, Appendix C) that:
- ※ 50 dwellings can be accommodated within the existing network without the need for network reinforcement, based on a Point of Connection to manhole SU94042401 in the south of the site;
 - ※ a solution for the whole site would be provided via a detailed assessment once planning permission has been granted;
 - ※ the nearest point of connection where capacity for the whole development is currently available is Lidsey WTW, which is located approximately 1km southeast of the site.
- 5.2.3. The proposed development is expected to require the diversion of two of the on-site foul sewers that cross the site from west to east. This offers an opportunity to improve maintenance access and construct these in modern materials such as structured wall plastic pipes replacing the existing vitrified clay and reducing the risk of groundwater infiltration for these lengths.

² Design and Construction Guidance (2021), *A design and construction guide for developers for Foul and Surface Water Sewers offered for Adoption under "The Code" for developers*, Ofwat.



5.2.4. Three possible options for foul drainage strategy have been identified:

OPTION 1:

5.2.5. Connect by gravity to the existing (and diverted) on-site foul sewers.

- ※ Drawing LAW-WSP-ZZ-ZZ-C-DR-05001 (Appendix E) shows this option and demonstrates that the proposed development could drain by gravity to the existing foul sewer network.
- ※ Each development parcel would drain by gravity and connect locally to the on-site foul sewers.
- ※ Reinforcement works to the sewerage network would be identified and carried out by Southern Water to mitigate against any shortfall in existing capacity. These works could potentially be upstream or downstream of the Application Site dependent on Southern Water's detailed assessment.
- ※ This is the preferred strategy for the proposed development.

OPTION 2:

5.2.6. Connect to the Lidsey WTW via a new foul gravity sewer.

- ※ In this option a separate foul drainage network would serve the proposed development and connect to the existing network immediately upstream of the Lidsey WTW via a new off-site foul sewer.
- ※ This option is illustrated on Drawing LAW-WSP-ZZ-ZZ-C-DR-05002 (Appendix E).
- ※ This would result in deeper sewers and the need for Southern Water to construct a new gravity foul sewer between the Application Site and the Lidsey WTW along the Lidsey Rife corridor.

OPTION 3

5.2.7. Connect to the Lidsey WTW via a new on- or off-site foul pumping station and rising main.

- ※ This option would be similar to Option 2 in providing a separate foul drainage network for the proposed development but would drain to a new foul pumping station that would then discharge to another point on the existing foul sewer network via a new rising main.
- ※ This option would again be subject to Southern Water's detailed assessment.
- ※ If an on-site foul pumping station were required, an area of development would need to be provided to locate it (typically 8m x 12m, with appropriate access and 15m offset from habitable buildings).
- ※ If this option was taken Southern Water might want to consider an off-site location as part of a wider strategy for the area.

5.3 SURFACE WATER DRAINAGE STRATEGY

5.3.1. The surface water drainage strategy for the proposed development is to manage and attenuate surface water via the use of Sustainable drainage Systems (SuDS), including tanked pervious paving and attenuation basins, prior to discharge at Qbar to the Lidsey Rife.

5.3.2. This strategy will manage surface water sustainably and avoid an increase in flood risk off site. Refer to WSP's FRA (2023) report for more information.

6 CONCLUSION

- 6.1.1. There are existing public foul drainage networks within the immediate vicinity of the proposed Westergate development including on-site public sewers.
- 6.1.2. Southern Water has confirmed that there is capacity for 50 new dwellings to discharge to the existing sewer network at a location in the south of the site.
- 6.1.3. Southern Water has advised that the nearest point of connection with existing capacity for 400 dwellings is the Lidsey WTW.
- 6.1.4. Following any planning permission granted for the Application Site, Southern Water would carry out a detailed assessment and provide a solution for the whole development.
- 6.1.5. Under Section 94 of the Water Industry Act 1991 Southern Water is the drainage authority responsible for effectually draining the Lidsey WwTW catchment.
- 6.1.6. Southern Water was a consultee on the Adopted Arun District Council Local Plan which includes the Application Site as part of site SD5.
- 6.1.7. Southern Water has assessed growth and the effect of predicted growth on planning objectives and via the DWMP process has identified investment needs so that works can be planned to address these risks at the appropriate time.
- 6.1.8. The above demonstrates that Southern Water as Sewerage undertaker has a planned strategy aligned with the broader planning objectives to allow for local developments.
- 6.1.9. The design of the on-site foul sewer network will incorporate measures to reduce the risk of infiltration into the foul sewer network, subject to agreement with the adopting authority.
- 6.1.10. The surface water drainage strategy (refer to WSP's Flood Risk Assessment, 2023) will manage surface water runoff from the proposed development sustainably to avoid an increase in the risk of surface water entering the foul drainage network.
- 6.1.11. The outline foul drainage strategies demonstrate that the proposed development could be drained by gravity to either the existing on-site Southern Water foul sewers or a new off-site foul gravity sewer or a new on- or off-site foul pumping station.
- 6.1.12. There is therefore a process by which the impact of the development on the existing sewer network will be assessed and details developed alongside Southern Water as part of any reserved matters planning applications for residential development on the Application Site. This process, alongside Southern Water's DWMP, would ensure that risks from development foul drainage would be appropriately managed to mitigate against any negative impact on the existing foul sewer network.

Appendix A

SITE INFORMATION

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Appendix B

TOPOGRAPHICAL SURVEY

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Appendix C

SOUTHERN WATER RECORDS & CONSULTATION

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Appendix D

DEVELOPMENT LAYOUT

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Appendix E

DRAINAGE STRATEGY

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