APPENDIX 11.2 – HEWRAT

Not updated

A29 REALIGNMENT PHASE 1
WATER QUALITY - HEWRAT ASSESSMENT

Background

West Sussex County Council (referred to as 'the Applicant') is seeking to obtain detailed planning permission for the realignment of the A29 (referred to as the 'Scheme'), to the north of Eastergate and the north-west of Barnham, villages north of Bognor Regis.

WSP produced a Flood Risk Statement in 2019 which included a DMRB HAWRAT assessment of the water quality for the potential drainage outfalls as part of the Transport Business Case. Both the outline drainage proposals and the HAWRAT were prepared as a high-level assessment to solely support the A29 realignment Transport Business Case and therefore an updated assessment was undertaken for the A29 realignment Phase 1 detailed planning application.

The objective of the Technical Note is to summarise the findings on the HEWRAT assessment for the Scheme based on the latest drainage design (September 2020) in accordance with the DMRB 2019 - LA113 Road Drainage and the Water Environment, Revision 1.

The drainage design was undertaken by Jackson / Capita in 2020 and this assessment should be read in conjunction with the provided drainage documents which are also included in the WSP 2020 Flood Risk Assessment (FRA) for the A29 Phase 1 planning application:

- Capita 2020 - A29 Realignment Scheme - SuDS Management Train, Document No. A29-CAP-HDG-00-AN-D-0058, Issue/Revision S3-P04;
- Capita 2020 – Drainage Strategy Layout, Drawing No. A29-CAP-HDG-00-DR-C-0047 S3-P09; and,
- Capita 2020 – CS/099505 Drainage Strategy, Document No. A29-CAP-HDG-00-AN-D-0052 S3 P05.

This technical note also uses the available ground data for the groundwater assessment which was also appended to the FRA (WSP 2020). A list of the available groundwater data sources used in this assessment are listed below.

- Geotechnics (2019) – A29 Realignment, Eastergate. Factual Report – ground investigation to inform the A29 Realignment Transport Business Case;
- Land Science (2020) – ground investigations subsequent groundwater level monitoring undertaken to inform the A29 realignment Phase 1; and,
- Wilson Bailey 2018, 2019 and 2020 – ground investigations undertaken on behalf of Barratts;

Water quality and routine runoff

The proposals include 5 surface water catchments for the drainage design which manage the runoff generated along the Scheme via infiltration and attenuation and controlled surface water discharge to existing watercourses. Table 1 summarises the water quality and routine runoff assessment undertaken for each catchment.

Table 1 – Water quality and routine runoff for the A29 Phase 1

	Catchment 1A	Catchment 1B	Catchment 2	Catchment 3	Catchment 4
Outfall No.	1A	1B	2	3	4
Discharge to	Ground	Ground	Ground	Barnham Lane Ditch (watercourse)	School Ditch (watercourse)
HEWRAT assessment	Groundwater assessment	Groundwater assessment	Groundwater assessment	Watercourse assessment	Groundwater assessment ($Q95<0.001m^3/s$)
Score	Medium Risk	Medium Risk	Medium Risk	Pass with mitigation measures	Medium Risk

Input parameters, justification and analysis sheets from the HEWRAT assessment are enclosed for reference. Due to the low Q95 for this watercourse, School Ditch was assessed as a groundwater "shallow linear" feature.

The proposed drainage design includes embedded water quality mitigation measures which are highlighted in bold in table 2 below. It is assumed that adequate maintenance of the proposed SuDS features would be implemented and followed throughout the lifespan of the Scheme.

Table 2 – Mitigation measures for the A29 Phase 1

	Catchment 1A	Catchment 1B	Catchment 2	Catchment 3	Catchment 4
Runoff collection mechanism	Kerb drainage system	Kerb drainage system either side of carriageway for roundabout southern arm. **Swales** along the Link road	Discharge to **swales**, combined drainage and kerb system	'Over the edge' discharge to **swale**. Catchment 3 also has a section of combined drainage kerb.	Combined drainage and kerb system
Interception mechanism	None	None	**Grass swale**	**Grass swale**	None
Storage	Cellular storage	Cellular storage	**Infiltration pond**	**Attenuation Pond**	**Attenuation Pond**
Conveyance	Pipe system	Pipe systems and swales	'Over the edge' discharge to **swale**	'Over the edge' discharge to **swale or filter drain.**	Piped conveyance to attenuation pond.

Source: Capita 2020 - A29 Realignment Scheme - SuDS Management Train, Document No. A29-CAP-HDG-00-AN-D-0058, Issue/Revision S3-P04.

Indicative treatment efficiencies were assigned against each proposed mitigation base on Table 8.6.4N3 in CG501 - Design of highway drainage systems, Revision 2.

Table 3 – Total treatment efficiencies based on CG501 *(applying 0.5 reduction for non-primary treatment)*

	Catchment 1A	**Catchment 1B**	**Catchment 2**	**Catchment 3**	**Catchment 4**
Proposed runoff treatment	By-pass oil/petrol interceptor*	Swales + Oil/petrol interceptor	Swales + Infiltration Pond	Swales+ Attenuation pond + ditch (vegetated)	Attenuation pond + by-pass oil/petrol interceptor
TSS (% removal)	N/A	80	80	88	60
Dissolved copper (% removal)	N/A	50	50	63	40
Dissolved zinc (% removal)	N/A	50	50	61	30

The proposed swales would provide the minimum required treatment for Catchment 2. It should be noted that the proposed infiltration pond would provide further treatment as the CG501 guidance indicates that an infiltration pond *"facilitates the removal of dissolved metals and solids"* even though the efficiency of this mitigation has not been quantified in the guidance document.

The HEWRAT analysis for the outfalls assessed as groundwater (1A, 1B, 2 and 4) indicates that the risk of groundwater pollution from routine runoff from the Scheme is Medium. The HEWRAT analysis does not consider mitigation measures embedded into the drainage design of the Scheme. In addition, the traffic volumes are very low and well below the upper limit for the lowest traffic band and therefore the pollutant load and the overall risk are likely to be overestimated by the used method.

As included in the Capita 2020 drainage documents, oil/petrol interceptors have been proposed for catchments 1A, 1B and 4 as an additional treatment to the proposed design. CG501 guidance, however, states that *"Oil separators are designed to mitigate oils and cannot be relied upon to treat suspended solids or dissolved metals"*. This assessment indicates that sufficient treatment would be provided for all catchment except for a small portion of the site (Catchment 1A) where the mitigation provided is oil/petrol interceptor prior to infiltration.

LA113 Road Drainage and the Water Environment, Revision 1 states that *"the approach for detailed assessment of and groundwater quality and routine runoff shall be agreed with the relevant consultation body*". The Scheme is unlikely to achieve the recommended by the EA clearance of 1m between base of infiltration feature and groundwater level. The drainage proposals, including the proposed mitigation measures and the relaxation from the EA standards have been presented to the Lead Local Flood Authority (LLFA) and Arun District Council. They have agreed with the drainage proposals and have accepted the deviation from the EA standards. Please refer to the correspondence with the flood authorities included in Appendix B of the Flood Risk Assessment (WSP 2020).

Based on the above, the Scheme overall would incorporate sufficient mitigation prior to the discharge of routine runoff to ground or the existing watercourses.

Spillage Assessment

The potential effect of spillages has been assessed using the methodology outlined in Appendix D of DMRB LA113 Revision 1 with the results enclosed. This risk is defined as the probability that there will be a spillage of pollutant and that the pollutant will reach and impact the water body to such an extent that a serious pollution incident occurs. The risk is expressed as the probability of an incident in any one year.

Input parameters and results from the spillage assessment are enclosed for reference.

The Scheme was sub-divided into lengths of road falling within each of the categories with spillage rates associated with each category applied accordingly.

The AADT flow and the percentage of Heavy Goods Vehicles (HGVs) were provided by the WSP transport team for the 2023 year and 2038. This assessment uses conservative (the highest provided) values for AADT and %HGV.

It was assumed a conservative response time of more than 1 hour and no reduction factor. The predicted annual probability of a spillage with the potential to cause a serious pollution incident was calculated for each outfall as being considerably less than the acceptable threshold of 1.0% the Scheme.