Crawley Borough Council Addendum to Water Cycle Study

Final Report

January 2021

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Crawley Borough Council

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Revision History

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Contract

This report describes an addendum to the Gatwick sub-region Water Cycle Study commissioned by Crawley Borough Council.

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Purpose

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Executive summary

In November 2019, JBA Consulting was commissioned by Crawley Borough Council acting on behalf of the councils in the Gatwick Sub-Region (Crawley Borough Council, Horsham District Council, Mid Sussex District Council and Reigate and Banstead Council), to undertake a joint Water Cycle Study (WCS) to inform and provide updated evidence for the councils pre-existing and emerging Local or District Plans. This study assessed the potential issues relating to future development within the Gatwick Sub-Region and the impacts on water supply, wastewater collection and treatment and water quality.

The study used a growth scenario that was based on every potential allocation coming forward during the local plan period, representing a "worst-case" in each wastewater catchment. In particular this produced an overestimate of employment land to the north of Crawley. In addition to this, the study modelled two options for growth at Gatwick Airport, one of which included the utilisation of the standby runway. The standby runway option is being pursued by Gatwick Airport Limited through a Development Consent Order, which will take place outside of the Local Plan process.

An addendum to the original work was required in order to better represent growth in Crawley.

The original study came to the following conclusions relevant to Crawley:

- Although SES Water and Southern Water (SW) confirmed that they have sufficient water resources to serve the proposed level of growth, challenges have been identified with the Hardham groundwater abstraction and discussions are ongoing to investigate the sustainability of this abstraction.
- Crawley WwTW would exceed its flow permit during the plan period if no action were taken. Schemes to address capacity concerns at this works may take a considerable time to deliver, it is therefore important that phasing of development within these wastewater catchments is aligned with the delivery of additional capacity and early and continued discussion with Thames Water is required.
- Modelling of the impact of growth on water quality predicted that growth would cause a significant deterioration in water quality at many sites in the study area. However, this did not occur at WwTWs in the catchment impacted by growth in Crawley (River Mole catchment).
- An assessment of water quality in the watercourses adjacent to protected sites identified a risk of deterioration of the conservation status as a result of higher phosphate concentrations. In all cases, improvement in treatment processes at WwTW to treat at the technically achievable limit could prevent this deterioration.
- The land to the north of Crawley covered by the Area Action Plan (AAP) was highlighted as being at risk of nuisance odour due to its proximity to Crawley WwTW.

The addendum has updated the original growth projections in Crawley and re-examined the issues above.

- The addendum growth forecast reduces the total water demand in the Sussex North Water Resource Zone (WRZ). However, any increase in abstraction at Hardham would be unacceptable to Natural England without further investigation and appropriate mitigation measures in place. Water Neutrality was proposed as a potential solution in the original study, and this will now be investigated as part of additional study.
- A reduction in the total water demand in the addendum forecast in comparison to the original forecast results in the generation of less wastewater demand on Crawley WwTW. The flow permit is still likely to be exceeded between 2025 and 2030,

however the exceedance will not be as large, and it may occur later within that 5-year period. It is important that Crawley Borough Council engage early with Thames Water to ensure delivery of additional capacity is aligned with delivery of development sites in the local plan period. This engagement should also include Horsham District Council and Mid Sussex District Council whose local plan growth is also served by Crawley WwTW.

- The Thames basin water quality model was re-run using the addendum growth forecast. As in the original study, at WwTWs in the River Mole catchment, deterioration in water quality is predicted to be less than 10% and would not result in a change in Water Framework Directive class.
- The assessment of water quality impact on protected sites downstream of WwTW serving growth in the Local Plan period is unchanged. Deterioration can be prevented through treatment at the technically achievable limit.
- None of the sites identified in the Area Action Plan are at risk of nuisance odour, however a newly identified site at Steers Lane is approximately 500 south east of Crawley WwTW. An odour assessment at this site is recommended, to be funded by the developer.

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1 Introduction

1.1 Purpose of the addendum

The main Water Cycle Study (WCS) report completed in August 2020 was based on a scenario of all identified potential development sites coming forward during the local plan period, representing a "worst case" scenario in each wastewater catchment.

This work concluded:

- Although SES Water and Southern Water (SW) confirmed that they have sufficient water resources to serve the proposed level of growth, challenges have been identified in the Hardham groundwater abstraction and discussions are ongoing to investigate the sustainability of this abstraction.
- Crawley WwTW would exceed its flow permit during the plan period if no action were taken. Schemes to address capacity concerns at this works may take a considerable time to deliver, it is therefore important that phasing of development within these wastewater catchments is aligned with the delivery of additional capacity and early and continued discussion with Thames Water is required.
- Modelling of the impact of growth on water quality predicted that growth would cause a significant deterioration in water quality at many sites in the study area. However, in the catchments relevant to Crawley (River Mole catchment), deterioration was predicted to be less than 10% and would not result in a change in Water Framework Directive class.
- An assessment of water quality in the watercourses adjacent to protected sites identified a risk of deterioration of the conservation status as a result of higher phosphate concentrations. In all cases, improvement in treatment processes at WwTW to treat at the technically achievable limit could prevent this deterioration.
- The land to the north of Crawley covered by the Area Action Plan (AAP) was highlighted at being at risk of nuisance odour due to its proximity to Crawley WwTW.

The purpose of this addendum is to update the growth forecast with emerging information on Crawley Borough Council's growth, in particular employment land north of Crawley. The issues identified above will be re-examined in light of the updated forecast.

1.2 General approach

The latest housing and employment forecasts were provided by CBC and used to update the growth forecast for Crawley. This used the following documents:

- 1 Sept 2020 Base Date-HT2021-37
- Employment Land Trajectory (1 September 2020)

Recent completions that were included in the original study, but no longer appear on the updated housing and employment trajectories were retained. The distribution of windfall within the Gatwick sub-region was retained, although windfall at Crawley WwTW was increased based on the latest housing trajectory.

Horsham District Council have two strategic development sites to the west of Crawley that are predicted to be served by Crawley WwTW. Horsham District Council were asked for updated growth projections on those sites to inform this addendum. No changes were made to the forecasts of other neighbouring authorities.

Three scenarios for how Gatwick Airport may develop were published by Gatwick Airport Limited (GAL):

- Scenario 1 – retain the current single runway, two-terminal configuration. In this scenario passenger numbers are expected to grow to 61 million passengers per annum by 2032.
- Scenario 2 – Bring the northern standby runway into operational use alongside the existing runway. This would increase passenger numbers to 70 million by 2032.
- Scenario 3 – Build an additional runway to the south of the airport, using land currently safeguarded. This scenario is not currently being pursued by GAL.

Scenarios 1 and 2 were examined in the original study with Scenario 2 being included in the capacity and water quality assessments. Scenario 2 is being pursued by Gatwick Airport Limited through a Development Consent Order, which will take place outside of the Local Plan process and is subject to separate determination by the Secretary of State. Scenario 1 is therefore taken account of through the addendum work.

Thames Water advised that Rusper WwTW was due to close, and flows pumped to Crawley WwTW. Sites previously modelled as served by Rusper have been switched to Crawley in the addendum growth forecast.

Based on all of the changes detailed above, a new forecast for water demand and wastewater was created and the impact on the original assessments identified.

Unless stated, the methodology contained in the original study has been used, and the WCS report should be referred to for additional detail.

2 Impact on original assessments

2.1 Overview

Using the updated growth scenario, the probable impact on each assessment in the original study was reported and the requirement for further work defined. This is summarised in Table 2.1 below. It was found that further study of wastewater treatment capacity, water quality and environmental impact was required. All other conclusions in the original study would be unchanged.

Table 2.1 Impact of new scenario on original assessments

Original Assessment	Impact of revised growth scenario	Further study required in addendum?
Water resources	The original assessment was based on the housing need in each LPA area, and this has not changed significantly. Discussions on the sustainability of Hardham Groundwater abstraction are ongoing.	**No** – ongoing discussions on the sustainability of abstraction at Hardham will be reported.
Water supply	A site by site assessment was not carried out by SESW or SW in the original study and so is unaffected by the new forecast.	**No** (Original criteria will be applied to new sites for completeness).
Wastewater network	A site by site assessment was not carried out by TW or SW in the original study and so is unaffected by the new forecast.	**No** (Original criteria will be applied to new sites for completeness).
Wastewater treatment	This assessment assumed the "worst-case" of every identified potential allocation coming forward. The addendum estimate of growth will change the forecast at Crawley WwTW.	**YES** – headroom assessment should be repeated with new forecast.
Odour	The original study noted that the part of the area covered by the Area Action Plan was within 800m of Crawley WwTW. This should be revisited based on the latest employment site data.	**Yes –** screening of new sites is required.
Water quality	This assessment assumed the "worst-case" of every identified potential allocation coming forward. The addendum estimate of growth will change the forecast at Crawley WwTW in the study area and therefore the downstream impact is likely to change.	**YES** – Water quality modelling should be repeated with the new forecast.
Flood risk	No issues were identified in the original study and as the addendum contains a reduction in	**No –** new forecast reduces flow so flood risk would be reduced compared

Original Assessment	Impact of revised growth scenario	Further study required in addendum?
	flow at affected WwTWs, the conclusions will be unaffected.	with the original study
Environmental impact	This assessment assumed the "worst-case" of every identified potential allocation coming forward. The addendum estimate of growth will change the forecast at Crawley WwTW and therefore the downstream impact is likely to change.	**YES** – The environmental impact should be updated using the latest water quality modelling results.

3 Wastewater treatment

3.1 Updated headroom assessment

The whole of Crawley, as well as a significant part of Horsham and Mid Sussex, is served by Crawley WwTW. In the original study it was found that additional wastewater from growth was likely to cause the WwTW to exceed its flow permit during the plan period. Thames Water gave this WwTW a "red" assessment reflecting the scale of the upgrade required, and the time and cost to deliver it.

Figure 3.1 shows the difference in flow between the original WCS forecast and the addendum forecast, with the addendum forecast resulting in a significantly reduced flow in comparison with the original study, however exceedance of the flow permit is still predicted during the plan period.

When the growth forecast was collated, detailed information on trajectory was not available. Delivery of housing and employment land was therefore spread evenly across the plan period, with extant planning permission being delivered in the first 5 years of the plan and allocations being delivered in the remaining period of the plan. This allows an estimate of when the flow permit may be exceeded. It should be remembered that this is an estimate based on an assumed trajectory and exceedance may occur before or after this time based on actual delivery of development.

Both the original forecast and the addendum forecast result in the permit being exceeded between 2025 and 2030 (AMP8), however in the addendum forecast this is likely to occur later within AMP8 (towards 2030). This may allow more time for Thames Water to design and deliver a capacity upgrade, but early engagement with Thames Water is recommended to ensure that delivery of additional capacity is aligned with delivery of development. They will also require certainty that a capacity upgrade is required in that period before making the investment decision.

As noted earlier, Crawley WwTW serves a significant part of Horsham District, and some of Mid Sussex District. All three LPA must be aligned to make sure that the respective plans can be delivered without exceeding capacity at Crawley. The engagement with Thames Water should therefore take place jointly with Horsham and Mid Sussex District Councils.

As an upgrade is still likely to be required during the plan period, and the complexity of delivering it has not changed, Thames Water requested that the "red" assessment is still appropriate for Crawley WwTW. It should be remembered that a "red" assessment in this case does not suggest that growth cannot or should not be accommodated, it is a reflection of the complexity of an upgrade scheme in that location.

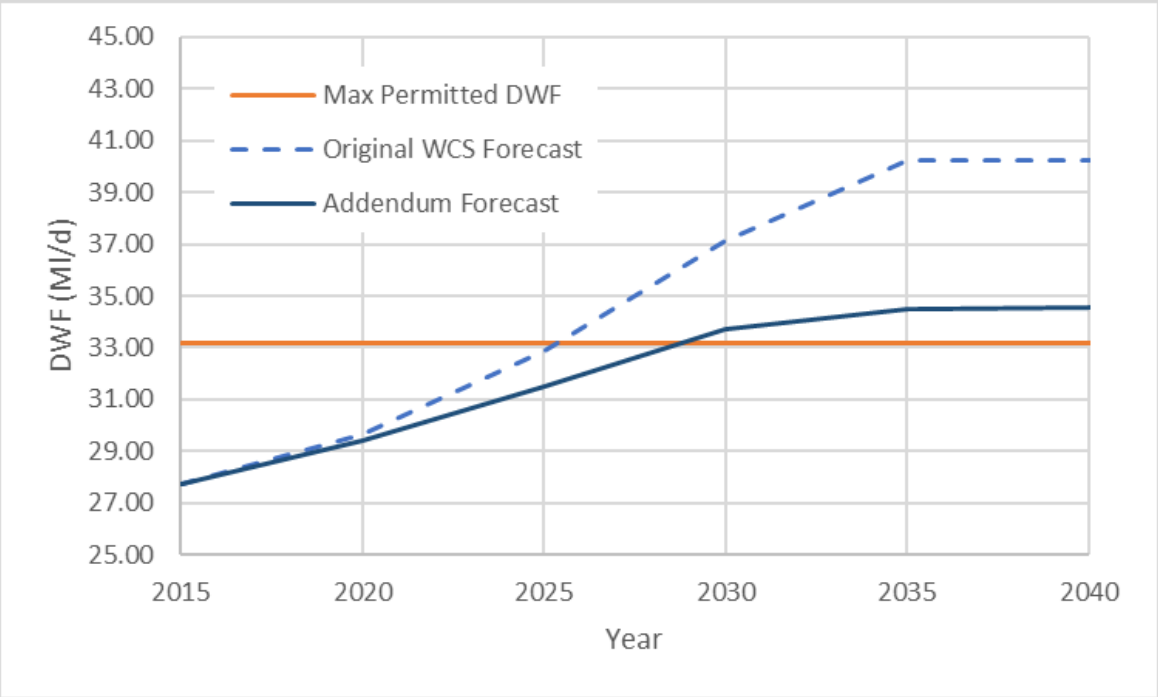

Figure 3.1 Prediction of DWF from Crawley WwTW over plan period

Table 3.1 Updated assessment of headroom

	Original assessment	Addendum assessment
Number of dwellings	22,717	15,802
Employment floor space	778,373 m^2	211,422 m^2*
Airport Option	Scenario 2 – Standby runway – 66,575 additional passengers per day	Scenario 1 – Continuity – 41,918 additional passengers per day
Flow permit assessment	Yes – between 2025 and 2030	Yes – between 2025 and 2030
Comments	JBA assessment shows the flow permit would be exceeded due to growth if no action was taken. TW gave this a "red" assessment due to the scale of infrastructure upgrades required.	The JBA assessment still predicts an exceedance in the flow permit, but this is likely to now occurs later (closer to 2030).

* Consisting of employment land included in the Employment Land Trajectory (1 September 2020) and recent completions.

3.2 Conclusions and Recommendations

The addendum growth forecast reduces the magnitude of the predicted permit exceedance and shifts it later within AMP8 (closer to 2030). Early engagement with Thames Water, and Horsham and Mid Sussex District Councils is required to ensure that delivery of housing and employment land in Crawley is aligned with delivery of additional capacity by Thames Water.

4 Odour Assessment

In the original study, the area in the north of Crawley covered by the Area Action Plan (AAP) was given an "amber" assessment for odour highlighting the proximity to Crawley WwTW and the potential for sites to be affected by nuisance odour. The Local Plan review is no longer pursuing the AAP, and the addendum growth forecast contains the individual employment sites for Years 1-5 of the Plan, and a proposed allocation for

industrial-led strategic employment at Gatwick Green. It is now possible to extend the screening exercise to cover these sites as well as the new housing site added at Steers Lane.

No employment sites are now considered to be at risk of nuisance odour, however the site boundary of the Steers Lane site is 500m south east of Crawley WwTW. An odour assessment is recommended as part of the planning process for this site, funded by the developer. All other sites within Crawley have a "green assessment".

5 Water quality

5.1 Methodology

The Thames SIMCAT water quality model was updated to include the changes in wastewater flows resulting from the addendum growth forecast. The rest of the model was unchanged, as was the methodology (see full WCS Report).

The full Thames model was run, however for clarity, only the WwTWs impacted by the addendum forecast are presented in the results.

5.2 Results

The modelling results for WwTWs receiving growth from Crawley, or that are downstream of these works within the River Mole catchment are presented in Table 5.1. None of these WwTWs are predicted to experience a 10% or greater deterioration in any of the three determinands (Ammonia, BOD and Phosphate), and do not deteriorate in WFD class. As in the original study, it is not possible to determine if growth alone could prevent good ecological status being met downstream of Horley WwTW.

5.3 Conclusions and recommendations

There is no change to the conclusions of the original study for Crawley Borough Council.

Table 5.1 Detailed water quality results

STW	Housing growth over plan period (dwellings)	Employment floor space (m^2) or number of employees/ PAX	Could the development cause a greater than 10% deterioration in WQ for one or more determinands?	Class deterioration?	Can the deterioration of class or >10% be prevented by treatment at TAL?	Could the development prevent the water body from reaching Good class?
Burstow	391	14 emp.	Predicted deterioration <10% for all determinands	No	n/a	No*
Crawley	15,801	211,421 m^2 +41,918 additional passengers per day	Predicted deterioration <10% for all determinands	No	n/a	No*
Horley	2,337	6,709 m^2	Predicted deterioration <10% for all determinands	No	n/a	Inconclusive (Phosphate)
Ironsbottom (Sidlow)	1	0	Predicted deterioration <10% for all determinands	No	n/a	No*
Merstham	512	250 m^2	Predicted deterioration <10% for all determinands	No	n/a	No*
Reigate	3,019	1,547 m^2	Predicted deterioration <10% for all determinands	No	n/a	No*

*the ecological status at these locations cannot reach Good class even without the addition of development, hence it is not what prevents the waterbody from reaching a Good class.

6 Environmental impact

6.1 Original findings

In the original study, the water quality modelling predicted significant deteriorations in water quality in watercourses adjacent to sites with environmental designations such as SSSI etc. In every case, this could be prevented by an improvement in upstream treatment processes.

6.2 Updated results

Only the River Mole catchment (Figure 6.1) is impacted from growth within Crawley and so only table 11.8 in the original report needed to be updated (see Table 6.1). The modelling results indicate an insignificant change in water quality downstream of Crawley between the original forecast and the addendum forecast. There is therefore no change in the conclusions of the original assessment.

Table 6.1 River Mole catchment WQ impact assessment

Protected site	Adjacent Waterbody	Predicted Impact		
			Original	Updated
Mole Gap to Reigate Escarpment SAC and SSSI Esher Commons Reigate Heath	River Mole (Horley to Hersham)	Baseline Phosphate Conc. (mg/l)	0.35	0.35
		Future Phosphate Conc. (mg/l)	0.35	0.37*
		% Deterioration	0%	6%
		Phosphate Conc. After treatment at TAL (mg/l)	0.14	0.14
		Can deterioration be prevented?	Yes	Yes

* This increase in phosphate concentration is due to difference in standard deviation between the model runs

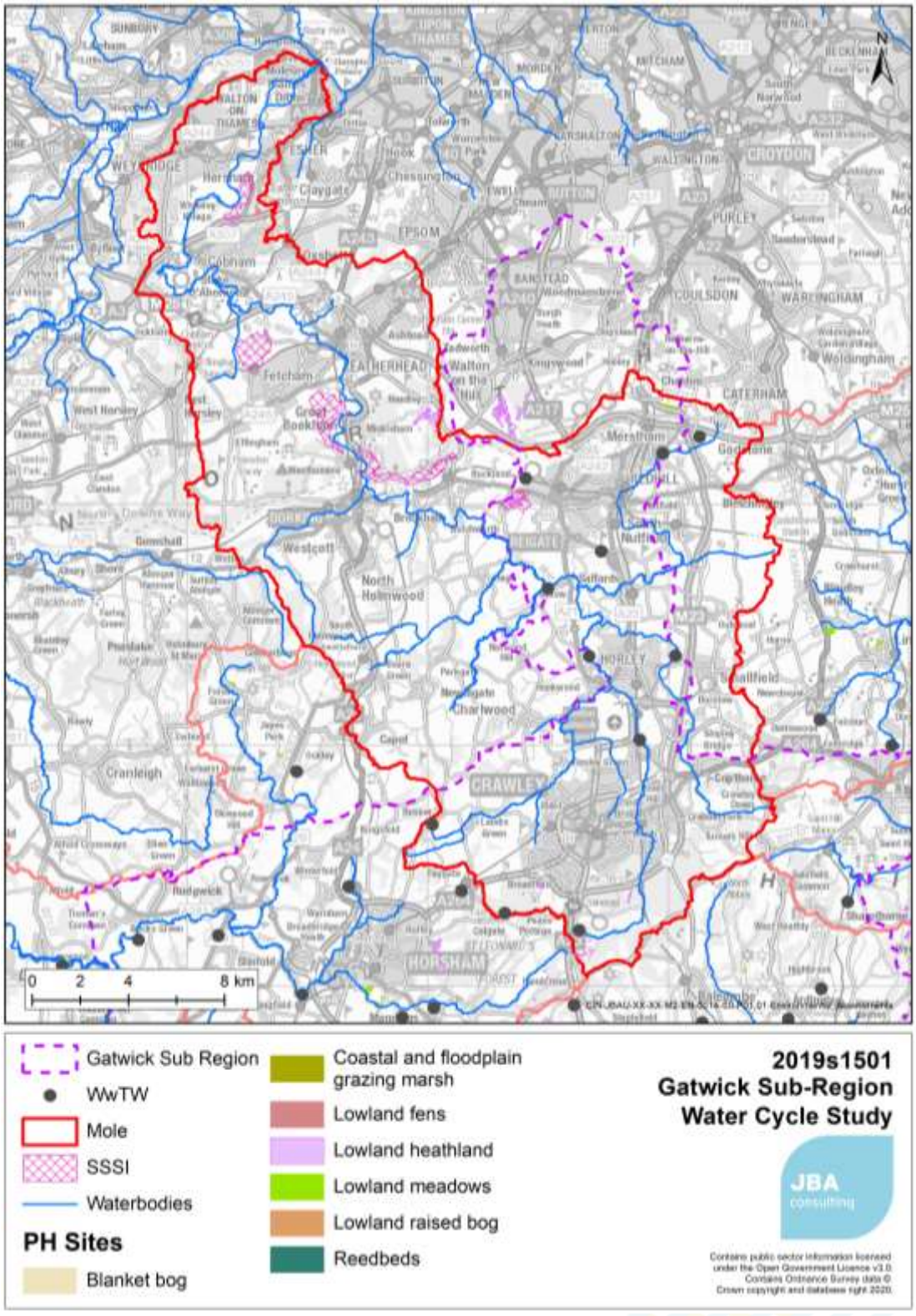

Figure 6.1 River Mole catchment protected sites

7 Summary and Conclusions

A new addendum growth forecast was collated incorporating:

- An updated employment forecast
- A new development site (Steers Lane)
- Change in scenario for Gatwick Airport
- Updated estimate of Growth in the north of Horsham

The impact of these changes is summarised in Table 7.1. Unless stated, conclusions in the original report in other topic areas still apply.

Table 7.1 Table of conclusions

Topic	Original conclusion (Crawley specific)	Updated conclusion
Wastewater treatment	If no action is taken, Crawley WwTW would exceed its flow permit during the plan period. Options exist to pump this flow to Horley, but both of these WwTWs are scored as "red" by Thames Water, indicating the scale of upgrades required. Schemes to address capacity concerns at these works may take a considerable time to deliver (3 to 5 years). It is therefore important that phasing of development within these wastewater catchments is aligned with the delivery of additional capacity, and early and continues discussion with Thames Water is required.	The addendum forecast results in a lower increase in wastewater reaching Crawley WwTW. Exceedance of the flow permit is still predicted during AMP8 (2025 to 2030), however this may now occur later during the AMP period.
Odour	The area of north Crawley covered by the Area Action Plan was identified as being at risk of nuisance odour from Crawley WwTW. An odour assessment is recommended as part of the planning process, paid for by developers.	No employment sites within the Area Action Plan were identified as being at risk of nuisance odour. A new site "Steers Lane" is 500m from Crawley WwTW. An odour assessment is recommended as part of the planning process, paid for by developers.
Water quality	No Crawley specific conclusions.	No change to conclusions.
Environmental Impact	A number of SAC, SPA, SSSI and Ramsar sites exist within the Gatwick Sub-Region, distributed between the four Local Authorities. There are also a large number of priority habitats and priority rivers. An assessment of water quality in the watercourses adjacent to protected sites identified a risk of deterioration in phosphate concentration. In all cases,	No change to conclusions.

Topic	Original conclusion (Crawley specific)	Updated conclusion
	improvement in treatment processes at WwTW to treat at the technically achievable limit could prevent this deterioration.	

Appendices

A Site tracker spreadsheet

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