

## **Water Resource Associates**

*A network of consultants in hydrology, water resources and environmental issues*

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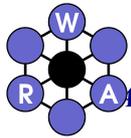
## **Proposed Residential Development, Land North of Hobbyhorse Lane, Sutton Courtenay, Oxfordshire**

### **Review of JNP Group Flood Risk Assessment Submitted December 2017**

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**Dr Harvey J. E. Rodda**

**January 2018**



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## Background

This brief note provides a review of the revised flood risk assessment (FRA) submitted by JNP Group in December 2017 as part of the planning appeal for the proposed Hobbyhorse Lane development. The review was undertaken by Water Resource Associates LLP (WRA) following a request from Sutton Courtenay Action. It includes references to the earlier material submitted by JNP Group as part of the planning application and earlier reports by WRA.

## Documents

The FRA documents reviewed by WRA consisted of the main report (30 pages), 13 appendices and a covering letter written by Bidwells to the Vale of White Horse District Council. The appendices consist of the following:

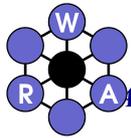
- Appendix A topographic survey (8 pages including 7 maps);
- Appendix B 6 pages of correspondence with the Environment Agency (EA);
- Appendix C 3 pages of notes from meetings with Oxfordshire County Council (OCC);
- Appendix D a letter and drainage plan from 2012 by FCC (6 pages);
- Appendix E the Thames Water sewer flooding records and asset search results (19 pages);
- Appendix F greenfield runoff calculations (2 pages);
- Appendix G infiltration tests undertaken by GRM (58 pages);
- Appendix H proposed drainage strategy option 1 (3 pages including 2 drawings);
- Appendix I proposed drainage strategy option 2 (3 pages including 2 drawings);
- Appendix J a flood routing plan (2 pages with 1 drawing);
- Appendix K proposed drainage strategy option 1 calculations (73 pages of software output);
- Appendix M proposed drainage strategy option 2 calculations (9 pages of software output).

## Overview of the JNP Group FRA

Overall there is very little difference between the latest FRA and associated documents and the earlier FRA by JNP Group submitted in 2016. Out of the appendices, only G to M are dated 2017, and Appendix G has a covering letter dated June 2017, but the text refers to infiltration tests undertaken in 2015. The others are from 2015 and the same as those included in the earlier submission. The FRA itself has a total of 30 pages instead of the 23 pages in the version submitted in February 2016. More information is included on the types of flood risk at the site, the issue of contamination and measures incorporated into the drainage design to reduce contamination. Some key aspects of the report, the observed depth to groundwater and the description of flooding at the site are incorrect. Ultimately the proposed drainage design is still inadequate and will be unable to function.

## Groundwater Observations

In the latest submission JNP Group have included observed groundwater levels from February 2016 on their proposed drainage option drawings (Appendices H and I) and within the text of the FRA. The maximum groundwater level they state as 0.62m below ground level (Section 5.8). This is however incorrect, as stated most recently by WRA in the report of October 2017 (Response to the Statement of WSP Relating to the Planning Appeal). The groundwater in the



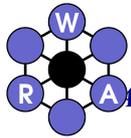
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north-eastern part of the development site was observed to reach the surface on 9<sup>th</sup> March 2016. This observation was recorded by GRM (2016) in one of their landfill gas monitoring boreholes and by a borehole on the recreation ground monitored by local residents. The observations from March 2016 have been omitted from the table in section 5.8 of the FRA. JNP Group have consistently ignored the fact that groundwater levels can reach the surface and that flooding of the site from high groundwater is a regular occurrence. They have in previous reports attempted to attribute the flooding to surface water runoff rather than high groundwater and have incorrectly stated that the problem was removed following the improvements to a drainage ditch alongside the adjacent landfill site. The statement in section 6.8 of the FRA: “*It is understood that no flooding has occurred at or near the site since February 2014...*” is wrong as demonstrated by both their own monitoring data, the local residents monitoring, and photos provided by local residents (see the WRA October 2017 report). At the time of writing, after a few days of rain in late December 2017 the ponding of water was beginning to appear in the development site (see Figure 1), demonstrating how flooding is a frequent occurrence and furthermore flooding around the drainage ditch adjacent to the landfill site was observed (see Figure 2) which refutes the claim that improvements to this ditch have prevented flooding. The rainfall over this period was not exceptional.



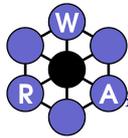
Figure 1. Standing water in centre of the development site in January 2018, looking to the south.



## Proposed Drainage Scheme

The new FRA provides two options for the proposed site drainage. The key difference is that option 1 has an impermeable tarmacked road through the centre of the site which generates surface runoff, and option 2 has the road constructed of permeable paving, which allows infiltration into the soil and groundwater. The drawings of these options are no different for those submitted with the earlier FRA, only that additional text has been added to give the groundwater levels in the areas where the detention basins and soakaways are located. These groundwater levels omit the maximum levels observed in March 2016, so they do not consider the worst case experienced during the short period of monitoring. In any case, the base of the detention basin where water is designed to infiltrate into the ground does not have a 1m clearance above the observed groundwater level, so it does not meet the requirements as stated in the latest SUDS guidelines (Woods-Ballard et al., 2015). Page 260 of the guidelines dealing with the general design considerations for infiltration systems states: “A *minimum distance of 1m between the base of the infiltration system and the maximum likely groundwater level should always be adopted.*” The base of infiltration basin 1 is given as 50.5m AOD, the groundwater level on 18<sup>th</sup> February 2016 is given as 50.56m AOD. The base levels for each infiltration system and the design groundwater level (assumed to be the maximum February 2016 level) have been extracted from the proposed layout and listed Table 1. None of the infiltration devices meets the criteria of the SUDS guidelines. In addition, the MicroDrainage software output for both drainage options presented in Appendix K and L, shows a status of “*flood risk*”. The software, which is not explained in FRA is used to test each feature of the drainage design by simulating the 100-year plus 40% rainfall for a range of durations. For option 1, all of the soakaways show the status of “*flood risk*” and for option 2 infiltration basin 1 shows a status of “*flood risk*”. The FRA makes no comment about this, but the obvious conclusion is that the soakaways and infiltration basin are unable to convey the required surface water volumes.

Other limitations of the new FRA are consistent with what has been presented before in JNP Group reports. The estimation of greenfield surface runoff is made using the outdated IH 124 method, which was widely accepted as being highly inaccurate, conceptually wrong and using outdated methods until it was replaced in 2016 by the ReFH2. There is no clear listing of the estimated greenfield surface runoff volume, the development site surface runoff volume, the peak greenfield surface runoff discharge and the storage volume required to ensure flows from the developed site do not exceed those expected under greenfield conditions. The submission of two different drainage system options should also be questioned as WRA has evidence where presenting alternative measures in an FRA rather than a definitive design has been grounds for EA refusal.



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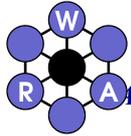
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Table 1. Comparison of infiltration device base levels and observed groundwater levels in February 2016 using values from the option 1 proposed layout drawing, JNP Group FRA December 2017 Appendix H.

Infiltration Device	Base of Infiltration Device (m AOD)	February 2016 Groundwater (m AOD)	Clearance above groundwater level (m)
Infiltration basin 1	50.50	50.56	-0.06
Infiltration basin 2	51.20	51.20	0
Infiltration basin 3	52.40	52.40	0
Soakaway 1	51.20	50.90	0.3
Soakaway 2	51.80	51.20	0.6
Soakaway 3	51.40	51.40	0
Soakaway 4	51.50	51.50	0
Soakaway 5	52.30	52.30-51.90	0 – 0.4
Soakaway 6	52.30	52.20	0.1
Soakaway 7	53.00	53.00	0
Soakaway 8	51.80	51.80	0
Soakaway 9	51.50	51.45	0.05
Soakaway 10	51.45	51.45	0
Soakaway 11	50.80	50.75	0.05
Soakaway 12	50.80	50.75	0.05
Soakaway 13	50.70	50.60	0.1
Soakaway 14	50.75	50.70	0.05
Soakaway 15	51.10	51.10	0

## Environment Agency Correspondence and Contamination Issues

The new FRA contained more detail on ability of the SUDS design to deal with potential contamination issues in Section 12. This included extracts from the SUDS guidelines and the presentation of a hazard index and mitigation index. It appears this additional text is in response to the EA correspondence which briefly noted contamination issues (Appendix B) and a more detailed letter from the EA to VOWHDC dated 23<sup>rd</sup> February 2017. In the February 2017 letter the EA reiterate the requirement that the infiltration devices should have a minim of 1m clearance between the base and the peak seasonal groundwater levels. This is not something which the design has been able to achieve as shown in Table 1. A detailed discussion of the potential contamination hazard and its mitigation by JNP Group does not rectify this inadequacy.

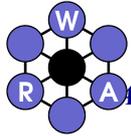


## Conclusions

The review of the revised JNP Group FRA from December 2017 has raised the following points:

- The FRA is not markedly different from earlier FRA submitted by JNP Group and the drainage design remains the same;
- The FRA references groundwater levels observed in February 2016 but ignores the highest groundwater observations in March 2016 when the water level reached the ground surface;
- The claim that no flooding of the site has occurred since 2014 when drainage improvements were made is wrong as flooding has been observed in March 2016 and January 2018;
- Photos in January 2018 show that the drainage improvements have not been able to prevent flooding;
- The FRA does not make use of the latest method for estimating greenfield surface runoff and does not present a summary of the greenfield flow volume, developed site volume and required storage volume to ensure the greenfield flows are not exceeded;
- The drainage design makes use of a number of infiltration devices but does not meet the requirements from the latest SUDS guidelines and Environment Agency as none of the devices have a minimum clearance of 1m between the base and the maximum groundwater level from February 2016.
- The design would be shown to be even further from the minimum requirement were the highest observed groundwater levels from March 2016 to be used;
- Testing the drainage design using MicroDrainage software shows a status of “flood risk” for many of the infiltration features;
- An inclusion of a section about the treatment of contaminants by the drainage design does not address the failure of the design not meet the criteria in relation to the clearance above observed groundwater levels;

Overall the review leads to the same conclusion as with WRA reviews of the earlier JNP Group FRA and associated reports, that the drainage design at the site will not function and the proposed development at the site is not sound or deliverable.



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## References

GRM Development Solutions Ltd 2016. Additional Gas Monitoring and Revised Gas Risk Assessment at Hobby Horse Lane, Sutton Courtenay.

Woods-Ballard, B., Wilson, S., Udale-Clark, H., Illman, S., Scott, T., Ashley, R., and Kellagher, R. 2015. The SuDS Manual. CIRIA Publication C753, London.

WRA 2017. Response to the WSP Statement Relating to the Planning Appeal, October 2017.

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