West Winch Housing Access Road

Chapter 11: Water Management – Appendix M: LLFA Correspondence

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Contents

1 LLFA Correspondence

This is a document showing a range of correspondence with the LLFA. The following information is included:

- Pre application advice. This pre-application advice involves seeking guidance on flood risk and drainage considerations before formally submitting a planning application.
- Meeting minutes from a meeting that took place 24/02/2021, showing a table with a series of LLFA comments and corresponding WSP proposed actions.
- Email correspondence discussing the potential surface water drainage strategy with regards to the drainage of the carriageway along the housing access road.
- Interface management and design tracker for planning application. This is a tracker showing the actions taken against items agreed in meetings with the LLFA.
- Email Correspondence on carrying out a topographical survey to establish design levels for the drainage strategy.

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via e-mail
Anthony Groom
WSP on behalf of Norfolk County Council Highways Authority

Your Ref: NA
Date: 24th February 2020
Email: llfa@norfolk.gov.uk

My Ref: FW2019_0601
Tel No.: 0344 800 8020

Pre-Application Advice: West Winch Housing Access Road (WWHAR)

We note that this Flood Risk Assessment and Drainage Strategy only reviews the proposal for the Housing Access Road but we are aware that the Local Planning Authority would like more detail on how this developments fits with the wider housing development. This may take the form of understanding the cumulative impact of housing and road developments together. It may also include a plan or masterplan of where SuDS elements will be and if there is sufficient room for these assets and the road without impacting on the delivery of the allocation of housing in the wider development or A47 upgrades.

If formally consulted we would **object** in the absence of an acceptable Flood Risk Assessment (FRA) / Drainage Strategy relating to:

- Local flood risk, ordinary watercourse flooding that may affect the location of SuDS assets, function of them (surcharging requiring additional storage) and bridging or culverting or the watercourses. Any compensation for loss of storage within flood zone 3 should also be identified.
- Local flood risk, groundwater flooding should be further assessed following the completion of ground investigations.
- Local flood risk, how a linear feature may cut off natural drainage catchments and how this will be mitigated.
- Provision of ground investigation results, drainage strategy drawings and calculations to support a planning application
- Confirmation that location for the discharges to all watercourses connect to the wider watercourse network and these and associated culverts are in good condition to convey flows. Also, how the IDB pumping regime may impact the conveyance of flows from the site.
- Inclusion of historical flood information
- Information on any brownfield development (existing roads) and how existing drainage may be improved back or close to greenfield
- How the development will provide any amenity and biodiversity benefits in line with the 4 pillars of SuDS.

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- How this development co-ordinates with other parts of the wider development for housing and A47 upgrade.
- Provision of a method statement including how riparian access for watercourses will be maintained and a timetable to show SuDS will have enough time to be vegetated prior to implementation.
- Clarification on who will maintain each of the SuDS features and culvert crossings.

Overview

The applicant has submitted a draft Flood Risk Assessment (FRA) and Drainage Strategy document relating to this proposed access road serving a 4000 dwelling development. This includes an upsizing of an existing stretch of the A47. The housing access road is intended to link the various parcels of the wider strategic development and create a connecting route from the A10 in the south to the A47 in the north. The existing land is mostly greenfield with mixed use including grazing. It is crossed by smaller roads and a field drainage dich network. Due to the linear nature of this development the proposed surface water drainage scheme discharge points are spread over a wide area. As such, individual characteristics of localised catchments will need to be taken into consideration. Previous studies of the area have highlighted an underperforming ditch network that would require further survey work to ensure connectivity to the wider watercourses including the Puny and Pierpoint drains. Further consideration will need to be given to the combined impact on the water environment from all phases of the wider development, including the access road.

The below response reviews the submitted and existing information and considers it in the wider context of the overall development. The annex contains a technical review of the FRA and Drainage Strategy.

Submitted Documentation

The FRA has provided a review of the pre-development flood risk to the housing access road development. It will be for the local Planning Authority and the Environment Agency to comment if realistic rationale for the section of the site lying within Flood Zone 2 of the River Great Ouse and River Nar being exempt from the Exception Test has been provided in line with the National Planning Policy Framework (NPPF) Planning Practice Guidance (PPG). The drainage strategy divides the Housing Access Road development into seven catchments, each with a dedicated attenuation pond and sediment forebay. Runoff from the proposed highway will be via gully / over the edge drainage to filter drain and then conveyed via existing ditches or swales to the ponds. Flows will then outfall, at a rate of 2l/s/ha, to existing ditches connecting to the wider watercourse. It is understood that the flows will ultimately enter the Puny or Pierpoint drains although it is not clear where flows from the south of the site will enter the wider watercourse. No drainage strategy layout drawing has been submitted, as such, we have been limited in how we can relate the proposed drainage scheme to that of the wider, 4000 dwelling development.

The Lead Local Flood Authority (LLFA) feel further consideration could be given to how the scheme relates to the wider development. In particular, there have been historic accounts of under capacity of the ditch networks conveying flows to the Puny and Pierpoint drains

(see below). As such, any development that will contribute to surface water runoff via these networks should consider the impact downstream.

Review of Existing Information

Downstream Network

We have reviewed other reports relating to this development:

- The Environmental Impact Assessment Scoping report (October 2019) for the 500 dwelling Metacre Ltd development (outline planning ref: 18/02289/OM).
- The North Runcton and West Winch (NRWW) Surface water Management strategy (April 2014).

The reports highlight the potential issue of the downstream ditch network being unable to convey site flows either to the Puny drain to the west or the Pierpoint drain to the north east. Resident testimony from the Metacre application has highlighted the infilling of the existing ditch network that has led to localised flooding. A recommendation by the LLFA in our response to the outline planning application (our ref: FWP19/2/4613) was to undertake a survey of the downstream network. We feel this should now be applied to the wider development. The NRWW report describes a ”pinchpoint” for flows directed towards the Puny and Pierpoint drains. A site-wide review of the downstream network that considers potential flows from the wider development is therefore recommended. This may highlight the need for upsizing/upgrading of the watercourse. It would also confirm connectivity, which, at present, does not appear to be guaranteed due to historic practices. The East of Ouse, Polver and Nar (Puny Drain) and King’s Lynn (Pierpoint) IDBs surface water management strategy document also recommended this network survey and they should be consulted regarding the potential impact on their respective drains.

Similarly, reports have highlighted the need to consult landowners and users affected by the downstream networks. Anecdotal evidence has described a degree of confusion over riparian responsibilities that has led to an historic lack of maintenance leading to over-vegetation and occasional infilling of ditches without consideration being given to the wider network. Consideration may also need to be given to long established grazing rights.

Development-Wide Surface Water Zoning

The NRWW report divides the site into seven zones with associated suggested areas for attenuation storage. We would advise the applicant to review this report and consider how the proposed road drainage strategy could be accommodated into these zones. The reports also recommend the preservation of existing drainage routes, the applicant would need to consider how the new access road may affect them. For example, the report states:

> “Zone 4 (38.56ha), straddles rectory lane and drains west to Puny Drain. In the base of the valley there is a drainage ditch that takes all the water from the area. This drain is not maintained by the East of Ouse, Polver & Nar IDB and would benefit greatly from better and more regular maintenance. There is also a culvert under the A10 serving development east of the road. The natural catchment of the

> 'valley' is approximately 800m wide (stretching from Mill Lane Farm in the north to south of Rectory Lane)."

As a drainage strategy layout drawing has not yet been submitted we are unable to determine how the proposed strategy relates to the NRWW report recommendations. We are aware of proposals at the Metacre 500 dwelling site for a separate conveyance route for future flows emanating from upstream as a result of the wider development. This foresighted approach would need to be rolled out to the wider development and co-ordinated to ensure optimal efficiency of the wider surface water management scheme. The access road, as an integral part of the development, would be a key factor. Should the preservation of existing drainage routes necessitate the creation of new, or the upgrading of existing, culverts then consideration would need to be given to the potential for increasing flood risk downstream.

Conclusion

. All sources of flooding have been considered (ground testing results will inform the assessment of flood risk from groundwater), and the drainage strategy has been modelled to demonstrate it can accommodate a 1 in 100 year plus 40% climate change rainfall event. Water quality mitigation proposals address the need to treat highways runoff prior to entry to the wider water environment.

Our concern remains how the WWHAR drainage strategy relates to that of the wider development. An integrated approach is advisable, not only during the phased construction process, but also in terms of the lifetime of the development. A comprehensive survey of the downstream network is needed. This should include consultation with landowners and IDBs. The preservation of existing drainage routes, and any associated culverts, would need to be considered at the earliest opportunity as their incorporation may impact on the design of the WWHAR.

Further detailed comments can be found in the attached Annex.

Yours sincerely,

Elaine

Elaine Simpson
Senior Flood Risk Officer

Lead Local Flood Authority

Annex: Norfolk County Council LLFA Additional Information to LPA

Applicant's Ref: NA	LPA: Borough Council of King's Lynn and West Norfolk
LLFA Ref: 2019_0601	Applicant name: NCC and King's Lynn Partnership
Site name/Description: Housing Access Road on land linking A47 and A10 near West Winch	Greenfield or Brownfield Development: Greenfield
Planning Stage: Pre-application advice	Summary of Surface Water Drainage Proposed: Surface water drainage of proposed and existing highways. Discharge to watercourses via seven attenuation ponds. SuDS quantity benefit: included SuDS quality benefit: included SuDS amenity benefit: not included SuDS biodiversity benefit: not included
Local Flood Risk : Summary of Local Flood risks in the vicinity of the site	

- **Surface water -** There are localised areas at risk of surface water flooding within and adjacent the development site boundary of 1% annual probability flood event as shown in the Environment Agency's (EA) Risk of Flooding from Surface Water (RoFSW) maps. These tend to correlate with the routes of existing watercourses. The LLFA consider that the 0.1% annual probability flood map can provide an indication of the 1% annual probability flood including an allowance for climate change and should be considered as part of any assessment

- **Critical Drainage Catchments (CDC)** - The application site does not fall within a CDC as defined by the District Council and the LLFA.

- **Ordinary Watercourses –** The site is crossed by various watercourses that appear to be connected to the wider watercourse network however this should be confirmed by on site assessment along with the current condition of culvets which may be relied upon to pass forward flows. In general, the northern end of the site tends to fall towards the north east and the existing Pierpoint drain running east-west approx. 0.5km from the site. The central area of the site falls towards the west and the Puny drain, running south-north approx. 1.3km from the site. The southern end of the development area falls to the east, to an un-named existing watercourse running north-south. We would highlight that the FRA in section 3.4.1 indicates that the Peirpoint and Puny Drains discharge to the River Nar when the LLFA understand that these are pumped to the River Great Ouse and Relief Channel (North Runcton & West Winch Surface Water Management Strategy – April 2014). **We recommend that the FRA updates the appropriate sections with information on how the watercourses connect to the wider network and information on how pumped regime may effect the water levels in these watercourses.**

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- The site does not lie within an internal drainage board (IDB) area however the ordinary watercourses do drain into the Downham Market Group Area and Water Management Alliance Areas. Flows west from the site will tend to enter the Puny Drain, the responsible IDB is the East of Ouse, Polver and Nar (Downham Market Group). Flows from the north tend to flow towards the Pierpoint drain which falls under the jurisdiction of the King's Lynn IDB (Water Management Alliance). Any works which could affect the flow in an ordinary watercourse which is outside of an IDB area will need consent from the LLFA, Norfolk County Council.

- **Groundwater –** British Geological Survey (BGS) mapping shows the geology of the site to consist of Mintlyn member – sand sedimentary bedrock overlain by Lowestoft formation, Diamicton superficial deposits. Three nearby borehole logs have confirmed the presence of clays across the site just beneath the topsoil, down to the borehole termination point. The FRA states in section 3.6.2 that groundwater was encountered in all three borehole records with levels between 1.52-8.23m below ground level (bgl). The applicant is currently undertaking a ground investigation including BRE Digest 365 infiltration testing. The results will be incorporated into subsequent revisions of the FRA.

- **Source Protection Zones –** The application site is not within a Source Protection Zone for groundwater.

- **Sewers** – There are very few surface water sewers within the area, but there are foul water sewers that serve the populated areas. The Norfolk County Council Surface Water Management Plan (Stage 1 report – Map A4) indicates there may be some highway drainage sewers in the A10, part of rectory road and chequers lane.

- **Artificial Waterbodies –** The site is not identified as being at risk of flooding from reservoirs on the EA Flood Risk from Reservoirs mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map) and is not in proximity to any canal or other artificial waterbody.

- **Historical Flooding** – There is one known incident of internal flooding recorded by Norfolk County Council in June 2014 on Main Road to the west of the larger development area (see pages 12-14 of the LLFA Flood Investigation report located at https://www.norfolk.gov.uk/-/media/norfolk/downloads/rubbish-recycling-planning/flood-and-water-management/flood-investigation-reports/kings-lynn-and-west-norfolk-2014.pdf). The LLFA have also had several reports of external flooding which have not been investigated but do relate to general drainage issues along the A10, Main Road, Gravel Hill Lane and Mill Lane. These areas are also shown in Map 08 of the Stage 1 Kings Lynn Surface Water Management Plan produced by Norfolk County Council in 2010. Testimony from local residents has described a tendency, in the past, for the moat south of Manor Farm to flood on to the adjacent field. This was resolved by upgrading the overflow to the watercourse conveying flow to the Puny Drain. There has been further, anecdotal, evidence of flooding of poorly-maintained drainage ditches. This is documented within the North Runcton & West Winch Surface Water Management Strategy dated April 2014 by the Middle Level Commissioners of the East of Ouse, Polver and Nar Internal Drainage Board. Page 8 of this report indicates that poor ground conditions (clay) and poor maintenance of

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the Ordinary watercourses outside the IDB area may contribute to these localised flooding problem (see Maps 10, 11 and 12 of this document). **We recommend that the Flood Risk Assessment is updated with this information.**

Policy: What we expect relating to site drainage and flood risk management.

The following national and regional policies apply to flood risk management within the planning framework.

Paragraph 163, 165 and 170 of the National Planning Policy Framework (NPPF) and supporting online Planning Practice Guidance (PPG) for Flooding and Coastal Change

Policies UC10 and UC11 of LLFA Local Flood Risk Management Strategy

The LPA will also have policies relating to flood risk management and the provision of SuDS. The applicant is recommended to review these specific requirements and have regard to them.

Guidance: Information for developers

Information for developers can be found on our website

- For guidance on our role as statutory consultee to the Planning Authority https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/information-for-developers

- For guidance on consenting of works that affect the flow of an ordinary watercourse https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/information-for-homeowners/consent-for-work-on-ordinary-watercourses

The SuDS Manual (CIRIA C753) can be downloaded for free from the CIRIA website

Assessment: Summary of assessment of local flood risk and submitted drainage proposals

The Flood Risk Assessment / Drainage Strategy titled 'West Winch Housing Access Road', WSP,70039893-FRA001, 19th November 2019) submitted, has been assessed against the National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG), the SuDS Non-Statutory Technical Standards (NSTS) (March 2015) and the policies of the adopted Norfolk Local Flood Risk Management Strategy as follows:

- The FRA considers all sources of flood risk but we highlight that further consideration of the potential for the ordinary watercourse flooding will be required. This will be to show that any road crossings e.g. culverts are appropriately sized or if compensation is required for any development within the equivalent flood zone 3 of these watercourses. It will also be required to show that any SuDS will be located outside flood zone 3 including an allowance for climate change to ensure they work as designed. Any discharges for proposed surface water drainage will also require to be shown that high water levels (which are understood to be common due to the pumped nature of the downstream network) have been accounted for. The northern tip of the site is located within Flood Zone 2. A widening of the existing stretch of the A47 is proposed for this location and consultation with the Envionment Agency would be required regarding this.. **We recommend that further infomraiton is provided with any planning application**

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- The sequential approach has been applied to this site. The majority of the site, including the newly proposed section of road, lies within Flood Zone1 with regard to main rivers However, any future development would have to demonstrate that fluvial flooding associated with the ordinary watercourses has been assessed and that the sequential approach has also been taken with regard to this. We would also advise that when further information is provided on groundwater that any areas that may be susceptible to high groundwater levels be identified and if it emerges, how this would be managed within the development e.g. SuDS assets. . **We recommend that further information is provided with any planning application**
- We have been unable to determine if drainage features are protected from all sources of flooding as the drainage strategy drawing has not yet been submitted. From the description in the drainage strategy document it appears that the attenuation ponds are located away from the proposed highways with outflow to existing watercourses. **Further information would be required with a planning application to determine if the SuDS assets would be protected from all sources of flooding and not increase flooding by embanking areas that would flood or the highway produce a linear structure that would cut off natural drainage patterns.**
- The SuDS discharge location hierarchy has been followed. With consideration being given to the use of infiltration techniques if ground testing (yet to be conducted) returns favourable results as Plan A. The applicant cites existing borehole data relating to ground conditions and argues that infiltration is unlikely to be a viable option as the main means of surface water discharge. Plan B would be to discharge to watercourse, which is more likely to be implemented due to the existing network of watercourses at the site. These, in turn, are believed to link to the wider watercourse network including the Puny and Pierrepoint drains. **Additional information will be required with a planning application to demonstrate that they do connect and that the conditions of the network is such that is can convey flows appropriately e.g. through culverts and along watercourses as expected.**
- The proposed discharge locations is to watercourses at various sites along the length of the development. The FRA states 'Just north of Rectory Lane, a land drain/ditch has been identified that appears to fall to the west and outfalls to Puny Drain 1.35km west of the site. Another land drain/ditch between Rectory Lane and Chequers Lane appears to fall west, likely to also outfall into Puny Drain west of the site. To the south of the site a further drainage ditch/land drain falls southeast and outfalls into Puny Drain 1.15km south of the site. North of the proposed junction with the A47 there is a land drain falling into the Pierpoint Drain 0.8km north, which then itself outfalls into the River Nar 2.5km west of the site. Just south of the existing Hardwick junction the road crosses a drain which also appears to fall north and then west into Pierpoint Drain'. The FRA provides no evidence of consultation with any landowners of downstream watercourses or with any relevant IDBs and it is not clear where flows from the south of the site will enter the wider watercourse network**.** We also highlight that the Pierpoint Drain is understood to be pumped to the Great Ouse and not the River Nar. **We recommend that further information is provided with any planning application**
- Greenfield runoff rates have been calculated for this site with the overall development being broken down in to five catchments, guided by the DTM catchments within FEH. We suggest that these catchments are ground truthed with onsite information e.g. topographic survey information. . Section 7.2 of the FRA suggest that maximum rates of 1.36l/s/ha, 3.84l/s/ha and 5.58l/s/ha being calculated for the 1 in 1, 1 in 30 and 1 in 100 year storms respectively. **The LLFA request the calculations to be submitted within the FRA for**

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any formal planning application as they are currently absent from Appendix H. We recommend that reasonable adjustments can be made to the soil value for IH124 calculations where it is shown that e.g. soil type 1 is not reasonable, this should be supported by ground investigation data.

- Greenfield runoff volumes post development are proposed to be been kept to either 2/s/ha or QBAR, whichever is the greater. The current FRA indicates that QBAR for all five catchments is smaller and as such the the proposal is to discharge at a rate of 2l/s/ha. This appears reasonable.
- We are aware that there may be upgrades to either Rectory Road or chequers lane as part of the development. We recommend that any surface water drainage schemes on these roads are returned as close as possible to pre development greenfield runoff rates and volumes. The existing brownfield runoff rates and volumes should be calculated and show what betterment can be achieved on the site e.g. 100% back to greenfield or as close to it a possible.
- SuDS component elements comprise the conveyance of surface water via over the edge drainage into swales / filter drains or gully drainage into swales / filter drains. These features will be lined and under drained to discharge to catchment-specific attenuation ponds located at natural low points of the site. Where there is no kerbing along the route, it is proposed to use over the edge drainage to a swale or a filter drain underlain by a perforated pipe to convey surface water. Where kerbing is present, around proposed junctions, gully or kerb drainage is to be used. Due to the likely high groundwater levels and high water levels in watercourses the LLFA welcome that as much over the edge drainage into SuDS features such as swales will be utilised. **We would request further information on how the drainage scheme may include amenity and biodiversity benefits in line with the 4 pillars of SuDS**
- Surface water will discharge via seven outlets into existing watercourses. The ponds have been designed to accommodate 1 in 100 year plus 40% climate change event and discharge will be limited to greenfield rates or 2l/s/ha. It is our understanding that the applicant proposes two separate networks for the Highways England owned A47 and the local highways authority owned access road. **We are unable to determine the suitability of the locations of SuDS features due to the absence of a drainage strategy drawing or indication on how the A47 drainage will be delivered.** The proposed drainage system will be designed so that there is no surcharging in the 1 in 2 year, and no flooding in the 1 in 30 year rainfall events. The proposed ponds have been sized to attenuate the development surface water runoff for all events up to the 1 in 100 year plus 40% climate change event below the 300mm freeboard. Ponds have been designed such that if half drain down time exceeds 24 hours, a 1 in 10 year storm event can be accommodated within the freeboard. Until ground investigation results are available and based on existing information, all basins are assumed to be in close proximity to ground water levels and as a result will be lined to prevent groundwater ingress. We recommend that information be included to show how attenuation ponds outfalls may be surcharged and would affect the storage volumes required. We recommend that the pumped regime of the watercourses be considered and a reasonable proposal put forward to account for a delay in positive discharge from the site. **Further information would be required with a formal planning application.**
- The drainage strategy for this site divides the road into seven catchments (0.37 to 2.01ha) based on the existing site topography. Calculated discharge rates for each catchment based on 2l/s/ha range from 0.74l/s to 4.02l/s. Vortex flow controls will be used to limit flows to these rates. Table 7.4 of the Drainage Strategy gives details of pond dimensions

and associated impermeable areas to be drained. The strategy gives detailed accounts of how each catchment will drain with approximate locations and invert levels of receiving watercourses being given. Again, the LLFA feel it is difficult to determine the viability of these proposals without a drainage strategy drawing. Based on the descriptions given the proposals do, however, seem reasonable. We have not been able to identify which of the five greenfield runoff catchments each of the seven highways runoff catchments relate to due to the lack of drainage stragegy drawings

- Water quality treatment measures include attenuation ponds combined with sediment forebays. Where appropriate, flows will be collected at roadside by filter drains and conveyed to or from attenuation ponds via swales where viable. There has been an initial assessment of water quality using the CIRIA SuDS Manual simple index approach. This concludes that there would be sufficient water quality treatment with the proposals. Section 7.3.15 suggests a assessment in line with the DMRB (design manual for roads and bridges) will be undertaken. **We recommend this be included within any formal planning application.**
- Urban creep has not been considered as this part of the development is for road development only.
- The applicant has Appendix L of the FRA indicates that a method statement detailing the management of surface water during construction has been produced but not provided. We recommend that this is included with any formal planning application. We would welcome that any drainage strategy for the management of surface water considers how sustainable drainage relates to the whole site. In particular, highlighting where different future phases rely on each another for connection to the final discharge location and how this will be implemented, during construction and operation of the development, This would also include how riparian access for watercourse maintenance may get cut off during construction of the road prior to the housing being developed. We would also suggest that a blue green infrastructure delivery plan is considered alongside a construction delivery timetable to ensure that all SuDS are established and vegetated prior to implementation.
- Other than stating flows will be directed to attenuation ponds, the applicant has not identified exceedance routes for flows in excess of a 1 in 100 year rainfall event plus 40% climate change allowance. This will be expected at detailed design stage. Consideration should be given to the expected depth/velocity of flood water to quantify any potential risks in the event of exceedance of the drainage inlets.
- A provisional management and maintenance plan has been submitted. A plan should be submitted at a detailed design stage identifying the required actions and responsible owners should be submitted to ensure that all parties understand their responsibilities. This includes all drainage infrastructure, Consideration may need to be given to the ongoing maintenance of watercourses both upstream and downstream of the attenuation ponds. Whilst it is assumed that Adopting Authorities will be Norfolk County Council and the Highways Authority (A47), this has not been stated within the FRA. **We recommend that this is clarified.**

SuDS Standards: Summary of alignment to relevant Non-Statutory Technical Standards for Sustainable Drainage systems

S2 (Greenfield) – : The information provided initial has shown that runoff rates will not increase post-development for the 1 in 1 and 1 in 100 years rainfall events

S3 and S5 (Brownfield) – further information is required for any brownfield redevelopment of existing roads.

S4/S6 (Greenfield) – : The information provided has shown that runoff volumes will not increase post-development for the 1 in 1 and 1 in 100 years rainfall events. but these will need to be revised if the outfalls to the watercourses are surcharged.

S7 – : Calculations are absent to to show that there will be no flooding on the development for a 1 in 30 year rainfall event

S8 - Calculations have been provided to show that there will be no flooding on the site for a 1 in 100 year rainfall event plus 40% climate change but these will need to be revised if the outfalls to the watercourses are surcharged.

S9 –: The applicant has not identified exceedance routes for flows in excess of a 1 in 100 year plus climate change event. This will be expected at detailed design stage. Consideration should be given to the expected depth/velocity of flood water to quantify any potential risks.

S12 – pumping of surface water drainage is not currently proposed but if in future this is required, information needs to be provided to demonstrate that it is not reasonably practical to drain the site by gravity.

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West Winch Housing Access Road (Project No. 70039893)

Norfolk CC LLFA Pre-Application Advice - Progress meeting on 24/02/21

Present:

LLFA: Steve Halls (SH)

WSP: Anthony Groom (AG), Howard Palmer (HP) & Joe Leslie (JL)

	LLFA comment (from letter dated 24/02/20, ref: FW2019_0601)	WSP proposed action	LLFA Comment
1.	Check that local watercourse flooding does not affect the location of the proposed SuDS Assets. To include checks for loss of storage if located in FZ3 and any proposed compensation.	Show Surface Water flooding extents on Drainage Strategy Drawing (see also point 6a below)	Use 1 in 100 yr return period event.
2.	FRA to be amended to include assessment on groundwater flooding based on the results of the ground investigations. Drawing to show areas of high groundwater and emergence (if any).	Review GI Appraisal technical note (dated 02/02/21) and action as appropriate. Postscript: it has been established that a Phase 1 Geo-Environmental assessment has been carried out and this will be forwarded shortly.	Agreed. Also recommended that a Phase 1 Geo-Environmental Assessment is undertaken sooner rather than later.
3.	Assess any drainage catchments that are severed by the proposed scheme. Provide details of any mitigation.	Produce new drawing showing existing drainage catchments and identify affected watercourses and detail mitigation measures (culverted, diverted).	SH recommended in relation to point 3 and 16 that if an existing drainage map is available please forward it, if not then it should be undertaken now to map out the existing watercourses/ditches/dykes/channels etc and any hydraulic structures and maintenance access points.
4.	Provide ground investigation details in the FRA	Action now that the Ground Investigation Appraisal technical note is available	Agreed

	LLFA comment (from letter dated 24/02/20, ref: FW2019_0601)	WSP proposed action	LLFA Comment
5.	Provide Greenfield Run-off calculations. Adjust soil type according to ground investigation data. Provide 'ground truthing' to show that catchments areas are in line with actual ground form.	Greenfield run-off calculations available. Check soil type now that Ground Investigation Appraisal is available. See point 3 above, check catchment areas against LiDAR levels)	Use Host Classes soil type or from SI. Do FEH calculation.
6.	Provide Drainage Strategy Drawing in the FRA	Amend existing Drainage Strategy Drawing to:	
a.	Show Flood Zone limits to demonstrate SuDS assets are outside FZ2 and FZ3	Add Flood Zones Extents.	Agreed.
b.	To include location of all discharge points to the local watercourses	Show discharge points	Agreed.
c.	Show connectivity of the local watercourses to the wider watercourse network downstream, especially in the south of the site	Highlight existing watercourses and direction of flow	Approx. 0.5km downstream. If any of the road catchments migrate over one or two existing greenfield catchments due to split lines in the road alignment (i.e. transference of runoff to a catchment that never originally took it), then the greenfield rate will need to be based on the existing catchment area. Have no objection on moving stormwater across watersheds but the final discharge rates must be based on the greenfield scenario for the natural catchment areas. The required attenuation storage will be greater though.

LLFA comment (from letter dated 24/02/20, ref: FW2019_0601)	WSP proposed action	LLFA Comment
d. Show how the 7 proposed catchment areas fit within the 5 existing catchment areas identified in the greenfield run-off calculations	Need to show this on the Drainage Strategy Drawings or a new drawing	Check for cross catchment drainage. See point 6c above.
7. Within the Drainage Strategy provide:		
a. Calculations to demonstrate that the proposed flows can be accommodated within the existing watercourses and culverts	Simple calculations should suffice. Restricting the discharge rate to existing greenfield run-off rates or 2 litres/sec/hectare (whichever is the greater) should mean that there is no adverse impact on the existing watercourses.	Agreed.
b. Show how IDB pumping may affect water levels in the watercourses and how it may impact on conveyance from the site (surcharged outfalls!)	Need to obtain pumping details and variance in water levels from the IDB and run WinDES with surcharged outfalls (if required).	Recommend that WSP request modelling data from EA.
c. Details of amenity and bio-diversity benefits	Advice to be sought from WWHAR Environment Lead.	The provision of wet ponds could offer amenity and biodiversity benefits. SH also advised that National Standards are likely to be updated in Summer 21 - interception, biodiversity and amenity will become a mandatory standard as part of the revision

	LLFA comment (from letter dated 24/02/20, ref: FW2019_0601)	WSP proposed action	LLFA Comment
8.	Provide condition survey of all existing watercourses and culverts	Request made to HE on 22/01/21 for information on their drainage assets on A47 and at Hardwick roundabout.	At this stage NCC happy just to know where these are and their dimensions, not overly concerned by their detailed condition at this master planning stage. Some quick visual inspections will be fine.
9.	Provide evidence of consultation with Riparian owners and the IDB	IDB has been contacted – awaiting response.	Is any existing land drainage in fields affected?
10.	Update section on historical flooding in the FRA to include details for LLFA flood investigation report and how poor maintenance of watercourses outside the IDB area may contribute to the localised flooding problem.	Update FRA accordingly	Agreed
11.	Provide information on any brownfield development (including existing roads) and how drainage run-off can be reduced to greenfield rates	Update FRA accordingly	Agreed
12.	Provide details on how the scheme will provide amenity and biodiversity benefits	See point 7c above	Agreed
13.	Add water quality assessment based on DMRB criteria	Either Undertake calculations and update FRA although this is best done by the Ecology/water quality team	SH confirmed that use of the HAWRAT assessment tool referred to in DMRB is acceptable.
14.	Provide drawing showing exceedance flow routes	Show on Drainage Strategy drawing or provide new drawing	Agreed
15.	Provide details how the scheme fits in the wider residential development and A47 Upgrade	It is proposed to provide standalone surface water drainage systems for the HE & NCC parts of the scheme. It is understood this is consistent with HE & NCC adoption requirements.	SH confirmed that NCC Highways are now adopting open SuDS which only take highway water (Andrew Willeard is main contact).

	LLFA comment (from letter dated 24/02/20, ref: FW2019_0601)	WSP proposed action	LLFA Comment
16.	Provide a Method Statement showing how riparian access to watercourses will be maintained. Also include a timetable/programme to show how SuDS features will have time to be vegetated prior to implementation	WSP to investigate and update FRA accordingly	Maintenance strips to be a minimum of 3.5m around all basins and existing watercourses. For watercourses an access strip must be maintained along one bank as a minimum. See Point 3 above
17.	Clarify who will maintain the SuDS features and culvert crossings	All proposed SuDS features and culverts would be maintained by either Highways England or NCC. This will be clarified in the FRA.	In addition to HE and NCC, the IDB could be a potential adoptee

Supplementary actions/advice received from Steve Halls via e-mail on 26/02/21:

a) In absence of a design code the SuDS features should be designed in accordance with the minimum standards in the appendices of the SuDS Manual (C753).
b) WSP to forward latest site layout plan and outline drainage strategy as a shape file to SH.
c) Depth of water of 1.2m is ok in the basins, this follows ROSPA guidance and would mean they do not need to be fenced. Again, use SuDS Manual Appendices Table B.18 for minimum standards although this requires 1m max depth of water. Minimum 300mm freeboard is fine. Technically the basins should have wet benches 600mm below the max water line, but as these basins are not publicly accessible then it won't matter, if they are publicly accessible, they will need an aquatic wet bench.
d) Interception storage will be required, i.e. 150mm sump below the invert of the outfall to retain the first 5mm of everyday rainfall or first flush. This could also be designed in using infiltration if soakage is available.
e) If any overland flows are dissected by the road footing or its embankments, then a cross drain or French drain at the toe of the embankment feeding runoff towards existing watercourses is principle ok.

Date of next meeting: 01/04/21, 14:30hrs via MS Teams

Leslie, Joe

From: Steven Halls - Highways <steven.halls3@norfolk.gov.uk>
Sent: 02 August 2023 12:59
To: Leslie, Joe
Cc: Hamer, Gareth; Laws, Benjamin; Payne, Stuart; Groom, Anthony
Subject: RE: FW2023_0419 WWHAR Surface Drainage

Hi Joe

See comments below in red

Steve Halls MSc C.WEM MCIWEM GMICE
Senior Flood Risk Officer (Technical Lead)
Flood and Water Management
Community and Environmental Services
Tel: 01603 679351 | Mobile: 07747456698
The LLFA Teams are working flexibly and will be available by email and MSTeams. If you wish to speak to one of us, please email us at the addresses shown below and we will endeavour to contact you.
Email: suds@norfolk.gov.uk for flood schemes/projects
Email: llfa@norfolk.gov.uk for any pre-planning or statutory consultee enquiries
Email: water.management@norfolk.gov.uk for any reports of flooding, watercourse regulation or general enquiries

From: Leslie, Joe <Joe.Leslie@wsp.com>
Sent: Wednesday, July 26, 2023 12:15 PM
To: Steven Halls - Highways <steven.halls3@norfolk.gov.uk>
Cc: Hamer, Gareth <Gareth.Hamer@wsp.com>; Laws, Benjamin <benjamin.laws@wsp.com>; Payne, Stuart <stuart.payne@wsp.com>; Groom, Anthony <Anthony.Groom@wsp.com>
Subject: RE: FW2023_0419 WWHAR Surface Drainage

Hi Steve,

Thanks for your comments.

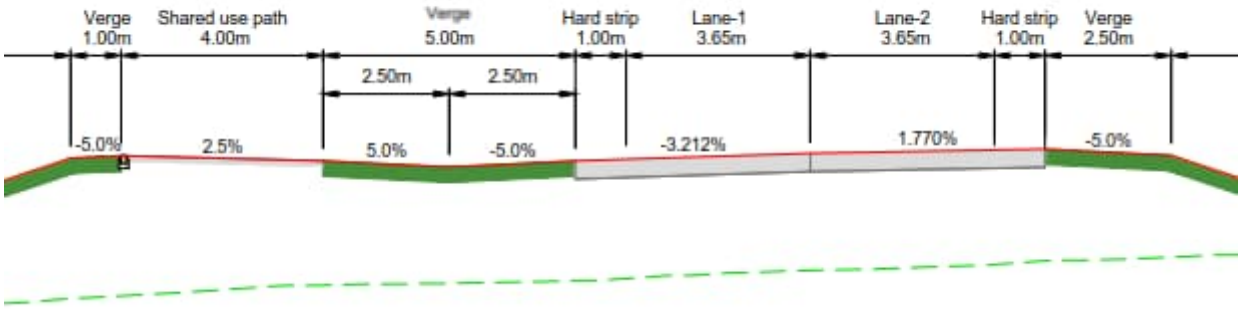
Firstly, are you able to advise regarding the PIMP value for verge/cutting areas please? Sorry not sure what you mean? PIMP is the percentage of the overall hardstanding across the full site, do you mean percentage runoff for the verges? In which case would use SPRHOST value for that.

With regards to the filter strip width requirements which you have now confirmed as minimum 2.5m, I have the following comments which I would be grateful for your feedback on:

<u>On the proposed Housing Access Road (HAR):</u>

- The proposed western verge width between the carriageway and shared use path is 5m, this would allow for a 2.5m filter strip on the carriageway side but not the shared use path side, however given the far lower pollution hazard presented by the shared use path I assume this would be acceptable? Yes

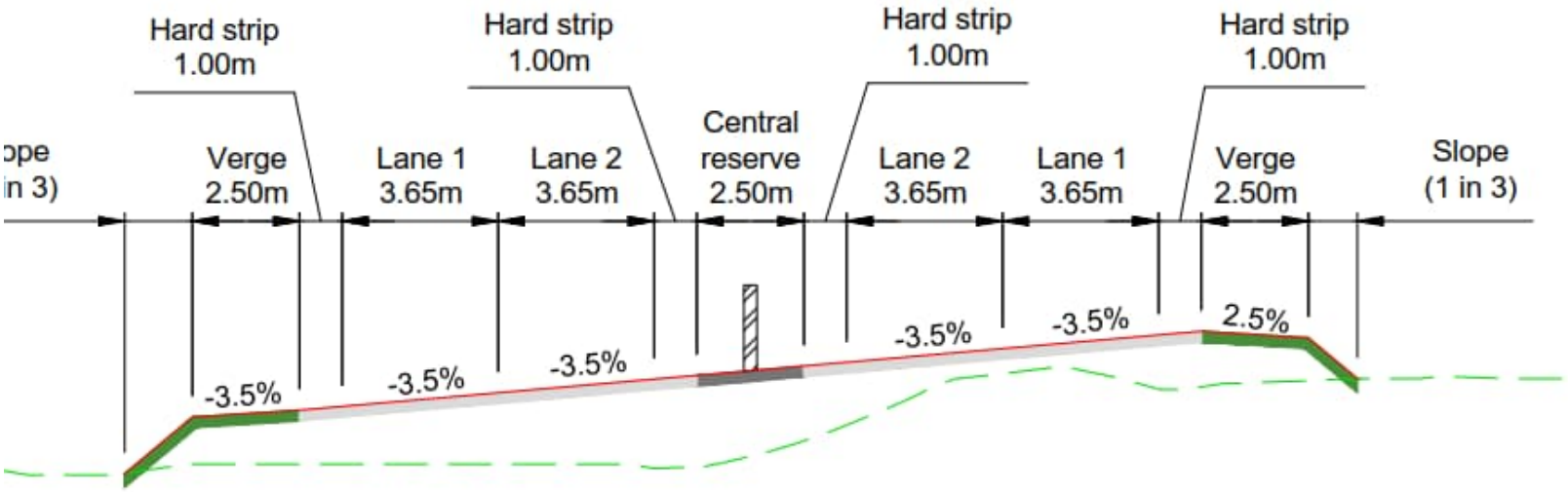
- On the eastern side of the HAR the proposed verge width is currently 2.5m, however, as there are no lengths of HAR proposed with superelevation to the east there will never be more than one lane width draining to this verge. Therefore, would a filter drain + varying width filter strip (dependant on filter drain size) within the 2.5m be acceptable? See below as alternative approach, but should be as close to 2.5m as possible. Definitely no less than 1m (roughly 20% of the flow channel length).



<u>On the proposed A47 dual carriageway:</u>

- National Highways (NH) will not accept any verges in the central reserve given the associated H&S maintenance risks for operatives, therefore it will not be possible to provide any filter strips in this part of the highway cross section. Noted

- The proposed A47 verge widths are 2.5m as this would enable a DMRB-compliant drainage system (grassed SW channels/filter drains) to be provided. Noted If we were to provide 2.5m wide filter strips as well as providing a filter drain in the verges, the verges would need to be widened significantly. How wide? We discussed this wider verge option with National Highways at a meeting yesterday and they expressed a strong preference against it due to additional maintenance requirements associated with wider verges and also flagged safety concerns relating to the increased likelihood of vehicles parking on the enlarged verges and using them as informal laybys. In light of these comments, would you accept the 2.5m wide verges (to include a filter drain + varying width filter strip dependant on filter drain size)? As this is trunk road and all lanes hung to the west, it will be genereate high pollutants and has highest pollution indices. As an alternative i propose you use a typical swale or grass SW channel which have slightly better treatment indices rather than filter drains, which then allows for a slightly reduced filter strip width. Maybe 2m say. It depends on the HEWRAT assessment says also.



Regards,

Joe Leslie
Principal Engineer
BEng (Hons) MSc GMICE
He/Him

T+ 44 (0) 1223 389657

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Charter House, 62-64 Hills Road,
Cambridge,
CB2 1LA
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From: Steven Halls - Highways <steven.halls3@norfolk.gov.uk>
Sent: Tuesday, July 25, 2023 10:33 AM
To: Groom, Anthony <Anthony.Groom@wsp.com>; Lead Local Flood Authority <llfa@norfolk.gov.uk>
Cc: Leslie, Joe <Joe.Leslie@wsp.com>; Subject: RE: FW2023_0419 WWHAR Surface Drainage

Hi Anthony

Have added comments in red, please note the requirement for the width of the filter strip. Consulting the SUDS Manual on this the guidance is fairly self-explanatory. Otherwise looks fine and will be good to see some plans at the next meeting.

Regards

Steve Halls MSc C.WEM MCIWEM GMICE
Senior Flood Risk Officer (Technical Lead)
Flood and Water Management
Community and Environmental Services
Tel: 01603 679351 | Mobile: 07747456698
The LLFA Teams are working flexibly and will be available by email and MSTeams. If you wish to speak to one of us, please email us at the addresses shown below and we will endeavour to contact you.
Email: suds@norfolk.gov.uk for flood schemes/projects

Email: llfa@norfolk.gov.uk for any pre-planning or statutory consultee enquiries
Email: water.management@norfolk.gov.uk for any reports of flooding, watercourse regulation or general enquiries

Disclaimer
We have relied on the accuracy and completeness of the information supplied to us in providing the above advice and can take no responsibility for incorrect data or interpretation, or omissions, in such information. If we have not referred to a particular issue in our response, it should not be assumed that there is no impact associated with that issue.

From: Groom, Anthony <Anthony.Groom@wsp.com>
Sent: 19 July 2023 11:16
To: Lead Local Flood Authority <llfa@norfolk.gov.uk>; Steven Halls - Highways <steven.halls3@norfolk.gov.uk>
Cc: Leslie, Joe <joe.leslie@wsp.com>; Hamer, Gareth <Gareth.Hamer@wsp.com>; Laws, Benjamin <benjamin.laws@wsp.com>; Payne, Stuart <stuart.payne@wsp.com>
Subject: RE: FW2023_0419 WWHAR Surface Drainage

WARNING: External email, think before you click!

Hi Steve,

Attached as promised. Please let me know if you have any comments.

Kind regards

Anthony Groom
Associate Director – Development
IEng FIHE

T+ 44 1223 558061

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Cambridge
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West Winch Housing Access Road (WWHAR)

LLFA Meetings

Interface Management and Design Tracker for Planning Application

Ref	Deliverable	Proposed terms of reference / documents to be provided	Status	Notes/Actions from Progress Call 06/07/23
1	Data collection			Feh Rainfall data from 2013 is currently being used - SH suggested using 2022 data however it was noted that this is not yet compatible with MicroDrainage software. It was suggested that the design continues based on 2013 data and then a sensitivity test is carried out based on 2022 data to assess the impacts. Catchment or point data was discussed and it was agreed that catchment data would be used. SH asked what discharge rate was being used from the basins into the existing drainage network. JL stated that this had previously been agreed with LLFA to be either Greenfield run off rates (Q bar) or 2l/s/hectare whichever is the greater.
2	Basin Design			SH states that the basins should all be designed to be positively draining and not require any pumping. SH - basins should be 1.2m max water depth (ideally 1m temporary storage and 0.2m permanent interception storage), 1:4 side slopes, if not fenced off then will need wet benches, sediment forebay (approx 10% of plan area). SH discussed the use of Swales and encouraged the use of these to convey surface water from the carriageway to the basins where this was possible, were levels allow for shallow gradients. SH also noted however that the LLFA were not against the use of filter drains and perforated pipes to convey surface water as this was still considered to be a sustainable solution. SH suggested that the width of filter drain in the design is checked to ensure that it is of sufficient capacity and required the addition of a filter strip as per the guidance suggested in the SUDs manual section 15.5. The detail was discussed which would involve a 40mm drop from the highway edge into the filter strip which would allow for collection of sediment. The filter strip should be approx. 2.5m wide where possible to allow sediment to be captured.
3	Conveyance System			It was agreed that the design of the conveyance system would be based upon a rainfall event of 1:30 year + a 40% allowance for climate change for both the A47 and HAR. It was noted that this differs from the 1:5 year rainfall event suggested in the DMRB, WSP would seek clarification as to if a departure from standard would be required from National Highways for this betterment. The 1% AEP + CC would need to be contained in the basins and the highway boundary if any flooding from the conveyance network occurs in these events. Modelling of the system will be required at planning to prove this either way or when first indundation occurs. The conveyance system at the roundabout was also discussed and it was proposed that this would be a combination of kerbs with gullies which would discharge into pipes. SH agreed that this proposal was reasonable but asked WSP to consider the treatment of this surface water. JL asked if proprietary products could be used to treat the surface water originating from roundabouts but SH asked if these can be avoided if possible, and are not considered a treatment stage by the LLFA - a SUDS alternative should be used if possible. SH accepted that where lack of space/distance to attenuation from kerbed areas was available then no additional treatment may be possible. WSP to show treatment stages on plan ahead of the next meeting for discussion with SH.
4	Drawings			For the next meeting on 03/08/23, SH requested to see draft drainage strategy drawings showing proposed WWHAR catchment areas, basin locations and general arrangement on plan view. It was agreed that draft drainage drawings showing proposed carriagway sections would be reviewed at the September 2023 meeting.
5	Drainage Strategy			SH mentioned that the Cv Volumetric Coefficient guidance for summer/winter respectively has changed from 0.75/0.84 - this is now 1.0 for all impermeable areas and 0 for permeable areas. SH to confirm Percentage impermeable value to use for any drained verges/cuttings. WSP to check current design with respect to revised impermeable area (1.0) described above. SH suggested that any perforated pipes should be located at least three metres from new and existing trees, in line with advice in Sewers for Adoption 6th edition. SH mentioned that Jason Morse, NCC highways maintenance team, should continue to be engaged with from a maintenance perspective as the design develops.
	Culverts			SH would like to review the current proposals for these and pick up from previous design meetings. LLFA will require early engagement with the Water Management consenting team to agree principles i.e. box culverts or large diameter pipes to maintain status quo

Leslie, Joe

From: Steven Halls - Highways <steven.halls3@norfolk.gov.uk>
Sent: 01 September 2023 10:51
To: Laws, Benjamin
Cc: Lead Local Flood Authority; Leslie, Joe
Subject: RE: WWHAR - Survey Requirements

Hi Ben

Have time Monday PM to go through this. When you say ponds I take it you mean the proposed detention basins (SuDS basins) and not any existing ponds?

We've had several issues with tracing watercourses and proving connectivity throughout this area for the WWHAR and resi infill developments. So making sure you pick up the watercourses that the proposed basins are going to discharge too on your surveys is key just in case these are not picked up on the LiDAR. I would ask you extend these surveys some distance downstream of the general location for proposed basins, getting a section every 15-20m. And then good coverage around the area of the proposed basins themselves to establish ground levels.

Regards

Steve Halls MSc C.WEM MCIWEM GMICE
Senior Flood Risk Officer (Technical Lead)
Flood and Water Management
Community and Environmental Services
Tel: 01603 679351 | Mobile: 07747456698
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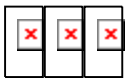

From: Laws, Benjamin <Benjamin.Laws@wsp.com>
Sent: Wednesday, August 30, 2023 3:25 PM
To: Steven Halls - Highways <steven.halls3@norfolk.gov.uk>
Cc: Lead Local Flood Authority <llfa@norfolk.gov.uk>; Leslie, Joe <joe.leslie@wsp.com>
Subject: WWHAR - Survey Requirements

Hi Steven,

On one of our recent LLFA update calls for the above project, we were asked to undertake some additional topo surveys in areas where ponds are proposed for the purposes of validating the lidar. We have surveyors ready to go out in the next couple of weeks but it would be useful to have a quick call so I can understand your expectations so we can ensure we are taking the correct data to satisfy your requirements.

Could you please let me know when would be convenient for a quick call to run through this with you?

Many thanks,

Ben

Benjamin Laws
Associate – Local Government Complex Projects
CEng MICE MAPM

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