Norwich Western Link

Drainage Strategy Report
Appendix 2: Third Party Liaison

Author: Ramboll

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Contents

1 Consultation with Norfolk County Council Lead Local Flood Authority.

Meetings took place on MS Teams on 4 April 2022, 22 September 2022, 17 October 2022 and 24 April 2023.

Correspondence received from LLFA included here:

1. Letter from LLFA ref. FW2021_1068 dated 13 December 2021
2. Letter from LLFA ref. FW2022_0707 dated 14 December 2022
3. Letter from LLFA ref. FW2023_0259 dated 4 April 2023
4. Letter from LLFA ref. FW2023_0243 dated 6 April 2023
5. Letter from LLFA ref. FW2023_0301 dated 21 April 2023
6. Letter from LLFA ref. FW2023_0343 dated 27 April 2023
7. Letter from LLFA ref. FW2023_0384 dated 9 June 2023

1.1 Correspondence with LLFA

1 -Letter from LLFA ref. FW2021_1068 dated 13 December 2021

Norfolk County Council

Norfolk County Council

Community and Environmental Services

County Hall Martineau Lane

Norwich NR1 2SG

via e-mail

CES Highways and Infrastructure Norfolk County Council *NCC contact number:*

Textphone:

Your Ref: *NWL – TQ15* *My Ref: FW2021_1068*

Date: *13 December 2021*

Dear

Norwich Western Link – TQ-15 Drainage Design Queries

Thank you for your consultation on the above site, received on 7 December 2021. We have reviewed the application as submitted and wish to make the following comments.

1. Further to Dean Shelton's response below, please confirm if FEH13 can be used throughout the entire project where a minimum 1 in 2 years return period would be used for the road runoff drainage calculations. This will eliminate the need to use FEH99 for the 1in1 year events.

LLFA response: As per Dean Shelton's previous response (email dated 12 November 2021) and the LLFA's Developer Guidance, the LLFA would favour the use of the most recent FEH methods and to avoid the use of FSR. While FEH99 is able to do the 1 in 1 year, the FEH13 has an additional 14 years of data. Therefore, a hydrology assessment should always be undertaken when preparing hydraulic modelling and a comparison of methods using the local site conditions should be undertaken to assess and select the appropriate hydrological approach by the developer.

2. Please confirm if the safety factor can be fully discounted for the infiltration basins which are designed in accordance with BRE365 procedure? Please refer to paragraph 13.1 of the Norfolk LLFA Statutory Consultee Guidance Document.

LLFA response: As per the LLFA's Developer Guidance (October 2021), the safety factor can only be discounted from infiltration features if the infiltration feature is designed in accordance with BRE365 design procedure which does not allow infiltration through the base. Evidence will be requested to demonstrate that this design approach has been applied correctly.

Continued…/

Continuation sheet to: FW2021_1068 Dated: 13 December 2021

-2-

3. Please confirm the minimum safety factor which should be used for the infiltration basins where infiltration through the base and sides is allowed. Please refer to paragraph 13.1 of the Norfolk LLFA Statutory Consultee Guidance Document. The guidance states that the calculations should use at least the middle column of Table 25.2 (C753 extract below), which in our case would be SF 5. However, due to rural location of the scheme the consequences of failure could be classified as "No damage or inconvenience" which would suggest that SP=1.5.

   LLFA response: The LLFA would seek the minimum application of their guidance unless suitable evidence is provided by the applicant to support the case that no damage or inconvenience to local property, land and infrastructure could be suitably demonstrated in a quantifiable way.

4. NWL drainage lagoons have been designed to include a primary, lined detention basin and the secondary infiltration basin. Please confirm if the attenuation storage required should be provided as a sum of volumes of both basins.

   LLFA response: The applicant must demonstrate that their development does not increase flood risk and the proposed design can attenuate the surface water runoff up to and including the 1% AEP plus climate change allowance. Please be reminded that the LLFA require the four pillars of SuDS to be applied by all applicants.

   Furthermore, the recent enactment of the Environment Act 2021 requires environmental gain to be provided.

Should you have any further queries, please contact the

LLFA directly.

Yours sincerely,

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Strategic Flood Risk Planning Officer

Lead Local Flood Authority

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.

1.2 Correspondence with LLFA

2- Letter from LLFA ref. FW2022_0707 dated 14 December 2022

Norfolk County Council

Norfolk County Council

Community and Environmental Services

County Hall Martineau Lane

Norwich NR1 2SG

via e-mail

Infrastructure Delivery

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County Hall,

Martineau Lane

Norwich

NR1 2DH

Your Ref: NWL – Drainage Strategy My Ref: FW2022_0707

Date: 14 December 2022

Dear

Town and County Planning (Development Management Procedure) (England) Order 2015
Norwich Western Link to the west of Norwich

Thank you for your ongoing consultation on the above site. We have considered the information and ongoing discussion and wish to make the following comments.

Over the last three months the Norwich Western Link (NWL) design team has been in discussion with the LLFA. There have been a series on meeting on 21 September, 20 October and 17 November 2022 which all have meeting notes available. In addition, two follow up informal discussion have occurred on 5 and 7 December 2022. The following discussion in the letter relates to the points raised in the meeting on 7 December 2022

based in the Drainage Strategy and supporting drainage scheme drawing provided on 2 December 2022.

In section 4 of the Drainage Strategy report states

> "Side roads intersected by the Project are all to drain to local infiltration swales; these drainage features will require further development during detailed design."

This would not be an acceptable amount of information at full planning permission stage. The LLFA will expect a full drainage design for the side roads where works will be undertaken.

In section 4 of the Drainage Strategy states

> "There are also a series of maintenance access tracks/NMU facilities: these are proposed to be drained to the nearest watercourse or infiltration feature.
>
> Attenuation will be provided within ditch prior to discharge. The risk of pollution

Continued…/

> from access vehicles and members of public is considered too low to warrant any further pollution control."

The LLFA queries whether the surface of the tracks are permeable or impermeable? In addition, while the LLFA acknowledges the pollution risks are much lower than on the main road, water quality will still need to be ass and an appropriate level of treatment included through the use of SuDs. Please ensure that this water quality assessment is included in the submitted information.

Section 4 of the Drainage Strategy report states

> "There is no interaction between the Project surface water drainage and Anglian Water sewer network."

The LLFA queries whether there are any private sewers and drainage networks in or adjacent to the study areas?

Section 4 of the Drainage Strategy report states

> "The design is currently in detailed design stage and a number of elements are still to be developed as part of ongoing liaison with LLFA and taking into consideration recent updates to national policies relating to the water environment."

While this statement is useful at this point in time, in the future final version of this report, this statement should be removed as the detailed design should have been developed by then.

Section 5.3 a list of design assumptions has been included which includes the infiltration rates and then directs you to the GI report. We have already discussed this type of issue where I have previously stated that you will need to write a summary of the information from external reports into the drainage strategy report. In general, there are a number of occasions in the report where there is a reference to another report but there is an inadequate summary of the relevant information provided in the report. In addition, while the text in section 5.3 acknowledges the current design development stage the project is at, in the final version of the report for full planning submission this would not be acceptable. You ll need to have a detailed design available for the application and the assumptions list would need to be much shorter.

In addition, the LLFA will need a summary of the key infiltration rates in the location of each of the infiltration basins in section 5 of the report. At present, the information about infiltration rates is inconsistently discussed in section 7. We acknowledge that information is shown in a table in section, but it is difficult to read in the table and the information provided in section 7 does not make sense. More context and explanation about the work that has been undertaken and the conclusions.

The LLFA notes that the applicant is seeking to use the complex control approach to discharging of flow (approach 1 in section 14.15 (and 14.13)), with the additional runoff volume at 2 l/s/ha. The LLFA was requested by the applicant to clarify the guidance on the additional runoff volume. The applicant sought clarification on whether the additional runoff volumes are calculated using the critical storm or the 6 hours storm.

The LLFA confirms that when the flow matching technique is used a separate storage element is required. This volume control or “long term storage” element is usually a separate basin to your main attenuation basin

and is sized to accommodate the 1% AEP 6 hour storm being discharged at no more than 2 l/s/ha. The LLFA will be seeking this as per policy S5 in the non-statutory technical standards for SuDS and BS8583.

For the main attenuation basin used for the peak flow control (using flow matching technique via complex controls here), the discharge rates are restricted to equivalent greenfield rates of 100%, 3.3% and 1% AEP events. However, in relation to the provision of long term storage, each control stage must be reduced by 2 l/s/ha to maintain the overall greenfield runoff rate for the site during the 100%, 3.3% and 1% AEP events. The peak flow control is based on critical duration.

The LLFA acknowledge that simple controls are much easier to provide for by using one rate and one basin. The LLFA will be updating the developer guidance to clarify this matter in a future update of the document.

The structuring of the drainage strategy in a sequential order and the summarising the options considered and discounted to develop the design would enable the applicant to demonstrate all the design considerations, investigations and options that have been explored throughout the design development process. The LLFA notes the information in the drainage strategy appendices needs to be included in the main body of the drainage strategy report.

The LLFA discussed the need and contents of the maintenance and management plan for the proposed surface water drainage design. The maintenance and management plan need to include all drainage structures for the plan to be considered complete and appropriate. The LLFA require confirmation that Norfolk Highways Authority have agreed in principle to adopt all the surface water drainage structures. Should any structures be

offered to third party owners, the LLFA will need to see an agreement in principle in the full planning application submission.

The LLFA has discussed the amount of information required in the design drawings and has requested that more information about the design is included on the drawings.

The LLFA has discussed with the applicant the need to address all four pillars of SuDS (water quantity, water quality, biodiversity and amenity). The LLFA requires the design will need to include amenity and biodiversity aspects in the Drainage Strategy in accordance with the LLFA Developer Guidance.

The LLFA advises the applicant that the upsizing of any culverts and flow control and conveyance structure will need to fully consider and assess whether the proposed works would increase flood risk elsewhere.

A review of the drawings identified that detailed drawings were not available at this time. On review of the drawings provided, the LLFA advised that further information would need to be included on future version of the drawings for the full planning application.

Information and details such as the modelled pipe run numbering, the pipe size, gradient, invert level, manhole details, road surfacing type to ensure the LLFA are able to determine permeable and impermeable areas. Further landscaping design details and how it links to

the attenuation design and biodiversity enhancement (which is one of the pillars of SuDS). The detailed design drawings will require typical plans and cross sections to be provided for all surface water drainage structures.

The design of the drainage system will need to provide information and assessment for exceedance flow management in the application. Plans

showing the routes for the management of exceedance surface water flow routes that minimise the risk to people and property during rainfall events in excess of 1% AEP plus climate change need to be provided. The plans will need to include the proposed ground levels and finished road levels to enable assessment of the flow exceedance routes by the LLFA.

The LLFA reminds the applicant of the requirement to demonstrate the maintenance access routes and areas to the surface water drainage infrastructure. The LLFA will expect access routes and operational space of an appropriate width and size marked on the detailed drawings. Within the report, the LLFA will expect both discussion and justification for the sizing of the access areas to ensure safe and viable to maintain the drainage infrastructure for the lifetime of the scheme.

The LLFA suggests that all reports are prepared using a plain English writing approach to ensure that information is both available to the public and technical specialists.

Further guidance on the information required by the LLFA from applicants can be found at here Flood and Water management

Yours sincerely,

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Strategic Flood Risk Planning Officer
Lead Local Flood Authority

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.

1.3 Correspondence with LLFA

3 -Letter from LLFA ref. FW2023_0259 dated 4 April 2023

Norfolk County Council

Norfolk County Council

Community and Environmental Services

County Hall Martineau Lane

Norwich NR1 2SG

via e-mail NCC

Infrastructure Delivery - CES

Norfolk County Council

County Hall

Martineau Lane

Norwich

NR1 2DH

Your Ref: NWL – Drainage Water Quality My Ref: FW2023_0259

Date: 4 April 2023

Dear

Norwich Western Link – Review of Interim Summary of Drainage Network Water Quality Assessment

Thank you for your consultation on the above site, received on 16 March 2023. We have reviewed the submitted information in the Interim Summary of Drainage Network Water Quality Assessment (dated 15 March 2023) and wish to make the following comments.

The LLFA notes that some of the basins and infiltration structure will discharge in the area of the Principal Aquifer. The applicant has indicated that the proposed design will provide treatment to the surface water through the use of the grassed swales and separate sediment forebays. The applicant acknowledges that catchpits, gullies and spillage controls are not counted in the treatment train although they are included in the proposed

design and will offer some water treatment and management benefits. However, on page 3, the applicant indicates the base of the basin will also provide treatment via percolation through the soil layers in the base of the basins.

While in the section of the report titled “Sensitivity of Underlying groundwater resources and downstream surface waters”, the LLFA notes that the applicant states that “Infiltration from Basin 3 and 4 is more likely to percolate to the Principal Aquifer, but this is located at significant depth below the basins and therefore additional treatment will be provided in the overlying soils layers”. The LLFA notes the applicant assessed the basin’s discharge as a medium risk. However, once the surface water has been discharged into the soil layer deep below the basins, the risk is considered to be low. The LLFA is concerned about this approach as only clean water can be discharged from the surface water drainage system. Therefore, the proposed surface water drainage system can only allow infiltration once the surface water has been treated and therefore means the base of the infiltration basin should not be considered as part of the treatment train nor the ground layers below the basins in the Principal Aquifer area. The LLFA requires further information to demonstrate that these sensitive water bodies would be protected from surface water pollutants.

Continued…/

Continuation sheet to: FW2023_0259 *Dated: 4 April 2023*
-2-

The LLFA notes the applicant indicates for the proposed attenuation basin for the A1067 network would have “an additional 300mm depth of topsoil is also understood to be included in the base of this basin”. The LLFA is concerned about the use of topsoil on the base of the basin which would result in the reduced permeability for infiltration. It is not clear whether ‘topsoil’ will be use as a filtration media or whether it will only be on the base of the basin or on the sides of the basin too. It is also not clear what the impact will be on the infiltration rate. The LLFA requires further design information to be provided. In addition, the LLFA requires confirmation on whether this design is only applicable to the A1067 basin or whether it will apply to all basins.

The LLFA notes the Environment Agency is responsible for the groundwater management greater than 2m below ground level. Therefore, the management of the Principal Aquifer is under the jurisdiction of the Environment Agency. The LLFA requires confirmation from the applicant demonstrating the Environment Agency’s support the proposed surface water system.

Further guidance on the information required by the LLFA from applicants can be found at Flood and Water management

Yours sincerely,

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Strategic Flood Risk Planning Officer
Lead Local Flood Authority

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1.4 Correspondence received from LLFA

4-Letter from LLFA ref. FW2023_0243 dated 6 April 2023

Norfolk County Council

Norfolk County Council

Community and Environmental Services

County Hall Martineau Lane

Norwich NR1 2SG

Infrastructure Delivery

Norfolk County Council

County Hall

Martineau Lane

Norwich

NR1 2DH

Your Ref: Norwich Western Link My Ref: FW2023_0243

Date: 6 April 2023

Dear

Review of the Draft Drainage Strategy for Norwich Western Link

Thank you for your consultation on the above site, received on 16 March 2023. We have reviewed the application as submitted and wish to make the following comments.

The LLFA has reviewed the Draft Drainage Strategy (Doc No. PK1002_RAM-HDG-MLE-SG-DZ-0001, Revision P03.1, dated 10 March 2023 and the supporting information provided.

We note that an out of date version of NPPF is being used in the report. The current version is dated July 2021 and contains some notable changes within it. Please review the extracts of NPPF to ensure they are up to date and to remove the number of typographical errors that require correcting due to the significant changes in the meaning of the text they

make. Such as “the local plumbing authority” and “the most valuable development” both on page 12. Please review all other policies extracts to ensure they are correct.

Please note that the Norfolk Flood risk management Strategy was updated in 2021 and it is not acknowledged in the Drainage Strategy.

There is no mention of the LLFA Developer Guidance or the SFRAs or the PFRAs.

Section 5.1 is looking at the existing site surface water drainage (pre-development). However, within the section it then states that the FRA concludes that the post mitigation of the proposed scheme has not increased flood risk. This is does not address existing flood risk and therefore this section will need to be rewritten with a relevant assessment of information.

Continued…/

Section 5.2.5 requires further information about the application of the discharge hierarchy or a Segway into the next sections as it is unclear what is happening here.

Section 5.2.6 has an incomplete sentence at the start of the section. The section identifies that infiltration testing was undertaken at each of the basins, although a method to the testing was not identified in the text. Then it states that Basin 1 and 5 will be attenuation basins but there is no justifications as to why. The LLFA notes that within the results tables for each of the basins it is not to clear why a set of results is shown in **Bold**. The LLFA is pleased to see that for most of the basins the worst-case infiltration rate has been identified at the proposed basin depth. However, for Basin 4 there is an initial table of results that indicates the applicant using a discounted infiltration approach. This is then contradicted in the text that follows the results tables where it says that the lowest of the relevant infiltration results. Please can you resolve the conflict of information within this section.

The infiltration testing summary table is supported by text on groundwater monitoring that not obviously related to the infiltration results and design discussion. We note there is unconfirmed evidence of perched groundwater and would suggest that further discussion to explain this information should be included in the report. There is a lot of jumping around in this section in terms of how the information has been presented and it is not always clear which basin is being discussed at the time. In addition, please can you reference where in the cross-referenced report the relevant information can be found.

Further information should be provided about the proposed planting arrangements in each of the SuDS features to demonstrate a diverse range of plants to help create a richer habitat. This information should be cross referenced to the any landscape plans and supporting strategies.

In section 7.3 there is mention of the use of concrete bag work. This is supported in drawing number PK1002-RAM-HDG-MLE-DE-DZ-0001 dated 10 February 2023, the LLFA observes a lot of concrete bag work included in the design for the berm details. The LLFA notes the use of concrete bag work effectively sterilises the ground and prevents

environmental enhancement opportunities. The LLFA requires further consideration of alternative materials to that would improve the environmental re-establishment opportunities. As previously indicated in recent correspondence with the IDB, they are also not supportive of including concrete bag work in the design. We are aware that concrete bag work has been used in other features. The LLFA requests further consideration of whether the concrete bag work is appropriate for all these design purposes. However, this also conflicts with information and statements that indicate the inclusion of a reinforced geotextile / turf mat to be included as scour protection. The LLFA requires clear communication of the proposed design and the options considered and selected for incorporation into the design. At present, it is not clear whether a concrete channel or reinforced geo-textile is proposed in the current version of the report.

Furthermore, in Table 1 of the report, there are a number of concerning references to concrete lined ditches. As previously discussed in other letters, a concrete lined channel is not acceptable.

The LLFA notes that there are a number of occasions where the applicant's report makes a vague reference to a design approach, but no supporting information and material is then provided in the report. The LLFA will expect detailed information such as in some of the draft technical notes that have been provided in the past to be included as appropriate in this detailed design report to evidence the technical justification for the design decision.

The LLFA notes to general discussion of the proposed inclusion of overflow weirs. However, it is not clear whether this is at all basins or just some. Furthermore, a discussion of the typical detailed design information (such as size, location and discharge rates) will need to be included for these structures and supported by the drawings.

The LLFA have reviewed the statement in the report of "the half drain time has been checked and where a time of 24 hours is exceeded, a check has been undertaken to ensure that additional runoff volume equivalent to a 1 in 10 year storm (without climate

change) can be stored within the available volume and freeboard." The LLFA can confirm that at present we will accept the 10% AEP, however, we will expect climate change to be applied to both the 1% AEP event and 10% AEP events.

The LLFA notes the biodiversity potential of the proposed design and the inclusion of the planting mixes. The LLFA requests the applicant share any prepared biodiversity assessment report that includes the consideration of the surface water drainage features as supportive evidence. This report should demonstrate the applicant's commitment to delivering a scheme that enhances biodiversity net gain and the amount and type of biodiversity net gain to be expected. The NETI team at Norfolk County Council would be able to provide further guidance on the BNG requirements.

In drawing number PK1002-RAM-HDG-MLE-DE-DZ-0004 dated 10 February 2023, The LLFA note there is no confirmed seed mix included within the design. Further information is required.

On drawing number PK1002-RAM-HDG-MLE-DR-DZ-0501 dated 10 February 2023, The LLFA notes that not all the flood plain area is mapped around the rivers. In addition, the LLFA recommends adding the high and medium surface water flood risk areas too.

Alternatively, this information could be presented in a specific drawing to reduce overloading information on the drawing.

The LLFA have not been through the hydraulic calculations in MicroDrainage in detail at this time as there is a high probability that these calculations will need to be updated.

Please see our previous correspondence on water quality assessment for the LLFA's comment. Relevant information from this response should be applied to the updated version of the design report.

These are initial comments and it is possible that other comments could be provided in any future consultations.

Further guidance on the information required by the LLFA from applicants can be found at Flood and Water management

Yours sincerely, --

Strategic Flood Risk Planning Officer

Lead Local Flood Authority

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1.5 Correspondence with LLFA

5 -Letter from LLFA ref. FW2023_0301 dated 21 April 2023

Norfolk County Council

Community and Environmental Services

County Hall Martineau Lane

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via e-mail

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Norfolk County Council

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Martineau Lane

Norwich

NR1 2DH

Your Ref: NWL – Concrete Bags Alternatives My Ref: FW2023_0301

Date: 21 April 2023

Dear --,

Norwich Western Link – Review of TQ-95 and TQ-96 Concrete Bag verses Flex MSE

Thank you for your consultation on the above site, received on 31 March 2023. We have reviewed the submitted information in the email dated 31 March from -- -- to the LLFA and wish to make the following comments.

TQ-95 – The Contractor would like to confirm whether the concrete bag solution needs to be changed to Flex MSE for the PEDs?

The LLFA has reviewed the Flex MSE specification and the information provided in the email. The Flex MSE or similar product is noted by the LLFA to be a solution suitable for

vertical and near vertical retaining walls. While the LLFA considers this solution more favourable than concrete bagwork, the LLFA query whether a reinforced turf solution has been considered prior to promoting the use of this type of product. The LLFA will seek written evidence from the applicant demonstrating that a suitable design specification discussion has been undertaken with the product manufacturer to ensure the product select is appropriate for use in that given application. This is to ensure the product selected is not an over or under engineered solution.

TQ-96 – The contractor would like to get clarified whether the concrete bags solution for the basins headwalls needs to be changed for the flex MSE one.

While the LLFA would not seek the use of the Flex MSE or similar product for the headwalls, the LLFA would suggest the consideration of appropriately sized pre-fabricated headwalls as an alternative to Concrete Bagwork.

Continued…/

Continuation sheet to: FW2023_0301 *Dated: 21 April 2023* *-2-*

Further guidance on the information required by the LLFA from applicants can be found at Flood and Water management

Yours sincerely, --

Strategic Flood Risk Planning Officer

Lead Local Flood Authority

Disclaimer

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1.6 Correspondence with LLFA

6 -Letter from LLFA ref. FW2023_0343 dated 27 April 2023

Norfolk County Council

Community and Environmental Services

County Hall Martineau Lane

Norwich NR1 2SG

via e-mail

Infrastructure Delivery - CES

Norfolk County Council

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Norwich

NR1 2DH

Your Ref: NWL – EW-228 My Ref: FW2023_0343

Date: 27 April 2023 Tel No.:

Dear

Norwich Western Link – Review of EW-228 Climate Change Allowance

Thank you for your consultation on the above site, received on 13 April 2023. We have reviewed the submitted information in the email dated 13 April 2023 from yourself to the LLFA and wish to make the following comments.

The contractor has raised an early warning in relation to a recent LLFA response dated 6 April 2023 (FW2023_). This has led to a query from the contractor relating to the amount of climate change allowance that should be applied for the 10% AEP event. The current guidance provides climate change allowances for 3.33% and 1% AEP events, but not for

less intense events. The contractor requests clarification on the need for climate change for this event and the amount of climate change allowance that should be applied.

The LLFA has reviewed the guidance and considers that as there is an absence of a 10% AEP event allowance for climate change, we would recommend the application of the 3.3% AEP climate change allowance for the 2070s epoch for the Upper End Allowance.

Further guidance on the information required by the LLFA from applicants can be found at Flood and Water management

Yours sincerely, --

Strategic Flood Risk Planning Officer

Continued…/

Continuation sheet to: FW2023_0343 *Dated : 27 April 2023* *-2-*

Lead Local Flood Authority

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.

www.norfolk.gov.uk

1.7 Correspondence with LLFA

7- Letter from LLFA ref. FW2023_0384 dated 9 June 2023

Norfolk County Council

Community and Environmental Services

County Hall Martineau Lane

Norwich NR1 2SG

via e-mail

Infrastructure Delivery - CES

Norfolk County Council

County Hall

Martineau Lane

Norwich

NR1 2DH

Your Ref: NWL – Drainage Strategy

My Ref: FW2023_0384

Date: 9 June 2023

Tel No.:

Email: --

Dear --,

Norwich Western Link – Review of Drainage Strategy and Supporting Design Information

Thank you for your consultation on the above site, received on 26 April 2023 and 1 June 2023. We have reviewed the submitted information and wish to make the following comments.

File Name: PK1002-RAM-HDG-MLE-SG-DZ-0001 Volume 1 text

Document: Norwich Western Link Drainage Strategy (PK1002-RAM-HDG-MLE-SG-DZ-0001) P04 17 April 2023

There are two other water assessment reports;

· Flood risk assessment (WSP 2022) (Reference 8)

· Water quality assessment (WSP, 2022) (Reference 9)

These have not been included in this review at this time.

Report
In Section 4.1 para 167 has been quoted but Para 169 has not. Para 169 should be included as it directly relates to the need for SuDS for all major schemes.

LLFA - notes to self: Basin 1 uses the slightly optimistic as the TP base has a level of 13.65m and produced an infiltration rate of 2.66E-06 while the IL of the infiltration basin base is 13.84m. There is a trend of a slowing infiltration rate as the depth of the TP both increases and decreases, which indicates this depth may be the most favourable depth for infiltration and yet the basin IL is set slightly higher than this depth. The LLFA has review the factor of safety applied to this structure which is 5 and is consistent with the previous discussions with the LLFA.

Continued…/

Basin 6 - the design shows that Groundwater level is 0.22m above the invert of the basin. However there is a significant range of movement in the groundwater levels as shown in the proposed design in Figure 17. At present Figure 17 shows the range of the ground water levels could completely fill the Basin 6 and would therefore not be able to provide suitable attenuation in periods of high groundwater. The use of the groundwater mitigation measures are presented in section 5.2.7 There is mention of the further data in the Ground Investigation Report but there is no presentation of the groundwater monitoring results in this report. Therefore, even with the groundwater mitigation measures proposed, the information shown in section 5.2.6 and 5.2.7 does not provide the LLFA with confidence that the basin will be available for use in times of high groundwater levels and wet weather. Further information needs to be included in the report to demonstrate the confidence in the range of the groundwater levels and frequency that high groundwater levels are likely to be presence. Essentially, the LLFA requires the applicant to demonstrate that Basin 6 will be available to attenuate surface water runoff from the road without interference from groundwater. At present the data included in this report does not demonstrate this.

Section 7.1 Swales contains Figure 20 which is of poor resolution. Therefore, it is not possible to read any of the information presented in the series of information. It is not possible to readily identify where the areas of hogging are. This section of information needs to be improved and the figure made clearer.

With regard to the maintenance and management plan, further work will need to be undertaken. At present the plan indicates that maintenance will only be undertaken "as required". There is no information informing the reader of when it is likely to be required or how often the inspections will be undertaken. The responses given are not in accordance with the advised maintenance schedules in the SuDS Manual (C753). Please update the maintenance and management schedule to make it SMART and in accordance with the industry guidance. While we appreciate that the Transport Asset Management Plan was referred to, there remains a need for the maintenance and management plan to cover all elements of the drainage system in the Surface water drainage maintenance and management plan.

Appendices

Appendix 4 - Shows that a Minimum Backdrop Height of 0.2m. This is not buildable and should be increased to be a minimum of 0.6m.

The surface water drainage calculations shown in Appendix 4 for the A1067 indicates that a MADD factor of 2 was applied. However the LLFA notes that as there are no other pipes in the network there is no need for this to be set at 2. Therefore the LLFA requires the MADD Factor to be set to 0 to prevent overestimation of the network storage capacity in the calculations to ensure modelled network reflects the proposed design.

The LLFA notes that in the calculations shown in Appendix 4, variable climate change allowances are applied as follows:

1 in 5 year with a 20% climate change allowance 1
in 10 year with a 0% climate change allowance 1
in 30 year with a 40% climate change allowance

1 in 100 year with a 45% climate change allowance

The LLFA notes that 0% climate change allowance is applied to the 1 in 10 year event and yet a 20% allowance is applied to a 1 in 5 year event. The LLFA requires that suitable amendments are made to the calculations or robust technical justification is submitted for this approach.

The LLFA notes that for the 1%AEP plus Climate change event in system SWS-ML02 the drainage network floods in at least four locations. While in SWS-ML04 for the 1%AEP plus Climate change event the surface water drainage network floods in at least two locations.

Appendix 6 - The LLFA notes the NDR Basin 1 Drainage Analysis has not been updated to Version 2 (dated 14 May 2020) to reflect the current surface water drainage policy and design parameter requirements. Therefore this would be considered as an outdated assessment.

Drawings

All Drawings - At present this and other drawings are marked as "Illustrative Issued for Planning". The drawings need to final design drawings by the time they are submitted as part of the planning application.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0002 NWL Drainage Typical Details Sheet 2 - Plan A shows an ancillary pipe connection. Where would this would be coming from? Is this going to be part of a typical design or is it present on just one headwall?

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0003 NWL Drainage Typical Details Sheet 3 - Are the seeding mixes going to be found elsewhere in the submission / drainage design?

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0004 NWL Drainage Typical Details Sheet 4 - The measurement units on some parts of this drawings are unclear and confusion. Please review and update as appropriate. In addition, on Typical Filter Drain Section, there is a comment that states "see details opposite" but it is not clear where it is directing the reader to. Please review all similar comments across these drawings and provide better cross referencing of information.

Also Note 8 on the drawing states that "Percolation tests to BRE365 are to be carried out within the trench of proposed trench soakaway prior to completing soakaway construction." This approach is not acceptable for a full planning application. This information must be included within the full planning application as otherwise applicant is not able to demonstrate the drainage design is viable.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0006 NWL Drainage Typical Details Sheet 6 - The drawings lack any dimensions. Please add some typical dimensions.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0005 NWL Drainage Typical Details Sheet 5 - The plans on this drawing is poorly annotated and it is difficult to interpret them in a meaningful way. Further work is needed to address this issue.

DWG: PK1002-RAM-HDG-MLE-DR-DZ-0501 NWL Drainage Key Plan - The "floodplain" (assumed to be Flood zone 3b) is only partly shown on the plan for the River Wensum and it is not shown at all for the River Tudd despite the redline boundary crossing into these possible areas. Please include this information for both rivers and the any ordinary watercourses on all the drainage layout plans. Please also include the surface water flood extent mapping for the high and medium risk areas.

Please that phrases like "tie in to existing NH A47 Drainage System to be agreed" will not be accepted at full planning application stage by the LLFA. Neither will the use of in abeyance bubbles on the drawings.

Please ensure you provide agreement in principle from the IDB and the Environment Agency to discharge to their watercourses.

DWG: PK1002-RAM-HDG-MLE-DR-DZ-0503 NWL Drainage Layout Sheet 1 of 10 - The table of design information at the top of the drawing has several statements in the Cover Level and Invert Level columns that state "Modelling Node". It is not clear to the LLFA what this means as normally modelling node have levels attributed to them. Therefore, clarification is required on the drawing and in the report to confirm that is meant by this. This also applies to other drawings in this series of sheets.

DWG: PK1002-RAM-HDG-MLE-DR-DZ-0504 NWL Drainage Layout Sheet 2 of 10 - There is a star with a high point on the drawing but it is not possible to see where the line is pointing to. Please improve this visual issue.

DWG: PK1002-RAM-HDG-MLE-DR-DZ-0505 NWL Drainage Layout Sheet 3 of 10 - What is the red dashed line? It is not shown on the key. Please address.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0551 NWL Drainage Outfall Details to Ordinary Watercourses - The labelling on the plans and sections of this drawing are incomplete and do not adequately convey the information. For example there is a cross section at the bottom that is untitled, the sections A-A does not appear to represent the section that is shown on the plan, while on other areas of the drawing the label is so limited that it is difficult to interpret the drawing clearly. Please review and update this drawing.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0552 and PK1002-RAM-HDG-MLE-DE-DZ-0553

NWL Drainage Outfall Details to Ordinary Watercourses - As these cross sections and plans are specific to this location further information regarding the location of where these plans relate to should be provided. Further information about specific levels and slope gradients needs to be added to the sections. The long sections do not relate to the cross sections. Also the vertical scale on the long sections is inappropriate as it is difficult to see the detail presented.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0560 and PK1002-RAM-HDG-MLE-DE-DZ-0561

NWL Exceedance Flow Plan - These plans shows the flood flow route for water not contained in the surface water drainage network during a 1% AEP plus climate change event rather than the exceedance flow routes during an event that exceeds the 1% AEP plus climate change event capacity. To remind the applicant, an exceedance flow route plan should show the finished floor and ground levels and identify the exceedance flow route.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0541 to 547 - The cross sections all show the chainage. Please have the 5m and 10m chainages marked on the sections as most elements of the features are shorter than 5m. Also please hatch in the access track areas to and around the basins on the plan view so they cross reference to the cross sections.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0543 - The headwall for the main infiltration basin area is shown to be underwater. Is this correct? In addition, the forebay headwall 2 is shown to have a walkway. The details for this walkway have not been observed. Please either cross reference to where they are or provide them.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0543 - A vehicular access ramp is shown to the main basin. Yet elsewhere in the documentation it was indicated that there would be no vehicular access to the basins bases to prevent compaction of the base. Please can you

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0544 and 545 - The LLFA notes the legend is incomplete for the items shown on the drawing. Please review the drawing and add the missing features to the legend.

DWG: PK1002-RAM-HDG-MLE-DE-DZ-0546 - The cross section lines on the plan are in a different colour when compared to the other drawings. This causes confusion. Please update to ensure consistency and clarity.

Further guidance on the information required by the LLFA from applicants can be found at

Flood and Water management

Yours sincerely, --

-- --
Strategic Flood Risk Planning Officer

Lead Local Flood Authority

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.

2 Consultation with Internal Drainage Board

Meetings took place on MS Teams on 21 October 2022, 16 December 2022 and 27 July 2023.

8. Correspondence exchange with IDB included here:

9. Various emails FER/ IDB in November 2022 regarding the proposals for a maintenance access culvert (MAC-2).

2.1 Consultation with Internal Drainage Board

8 -Email exchanges FER/IDB in November 2022:

Hi --,

The IDB's Operations Manager didn't have any significant concerns with the MAC-2 design if bank full capacity is to be maintained, however he did raise the following points:

- Will the culvert be designed to withstand loading by a 30 tonne tracked excavator? We would require a right of access for watercourse maintenance activities
- A soft/environmentally friendly option to replace the concrete bag benching would be preferred if possible. Our Ops Manager suggests rock rolls/mattresses or similar: Rock Rolls

I hope the above provides useful feedback on the culvert design. Please let me know if you require anything else on this.

Kind Regards,

WMA members: Broads Drainage Board, East Suffolk Drainage Board, King's Lynn Drainage Board, Norfolk Rivers Drainage Board, South Holland Drainage Board, Waveney, Lower Yare and Lothingland IDB in association with Pevensey and Cuckmere Water Level Management Board

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Your feedback is valuable to us, as we continually review and work to improve our services. So, if you have any suggestions, recommendations, questions, compliments or complaints, please complete one of our online forms: Feedback Form | Complaint Form

Norfolk County Council

Hi --

Hope you are keeping well. We have reviewed your comments and provided some answers as per the below in blue. Will these be acceptable? We would like to proceed with our AiP if possible with the concrete bag solution provided that you accept the reasoning below.

- Will the culvert be designed to withstand loading by a 30 tonne tracked excavator? We would require a right of access for watercourse maintenance activities.
  - We can confirm that a 30tonne excavator will be allowed to traverse over the culvert. This because the culvert will be designed for LM1, LM2 (as per AW and C&U regulations) and SV80. All road vehicles in the UK need to comply with the AW and C&U regulations.
  - In relation to the right of access, I will ask NCC to confirm.
- A soft/environmentally friendly option to replace the concrete bag benching would be preferred if possible. Our Ops Manager suggests rock rolls/mattresses or similar: Rock Rolls
  - We have also considered the use of the rock rolls/mattresses instead of concrete bagwork. It is noted that rock rolls are typically used as part of river works and not part of structure permanent works. There are two reasons why concrete bagwork is the preferred option:
    - Rock rolls/mattresses comprises a polyethylene net which it is unlikely to have a design life less of 120 yrs. Drain bed erosion protection, inlet and outlet are part of the permanent works which are required to be designed for 120 yrs life. Instead bagwork is certified for 120 yrs design life.
    - Inlet and outlet require a smooth transition from the vertical face of the RC culvert to the existing drain bank slopes. This can be achieved with bagwork. However, it is deemed that the rock rolls are not suitable for such application. Concrete filled bags are easier to transport, manhandled and place in order to achieve the required slope transition. Long rock filled rolls cannot be handled and easily position to achieved the varying slope inlet & outlet.

Cheers,

County Hall, Martineau Lane, Norwich, NR1 2DH
(United Kingdom)
www.ferrovial.com
ferrovial
construction

Hi --,

Hope you are well too.

Thank you for responding to our recent feedback. Our Operations Manager is generally happy with these comments and reasoning behind opting for a concrete bag solution, however would like to follow up on this by asking if you would be able to install a gravel riffle/glide upstream and downstream of the culvert to act as restoration features compensating for the culvert installation (for example, 10-20m US and DS using gravel rejects)?

Please take this as feedback of the culvert design and not an 'agreement in principle'. The final design of the culvert would be reviewed as part of a formal application for consent. If we were to consent this installation, we would likely include mitigation conditions, such as gravel riffles as suggested above.

Kind Regards,

Sustainable Development Officer
Water Management Alliance

3 Consultation with NCC Operations and Maintenance

Meetings took place on MS Teams on 27 July 2023 and 3 August 2023.

Correspondence exchange with NCC Operations & Maintenance included here:

3.1 IDB Meeting Minutes – 27/07/2023

AGENDA & MEETING NOTES

PROJECT NUMBER NCCT41793
MEETING DATE 27/07/2023
PROJECT NAME Norwich Western Link
VENUE Teams
CLIENT Norfolk County Council
RECORDED BY --
MEETING SUBJECT IDB meeting

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Item 0.1 Introduction

-- introduced as new RUK drainage lead replacing --

Item 1 Impermeable areas

Generally, no footways that drain into OWC

Some Maintenance access tracks (highlighted in below discussion) that only have occasional use will drain into OWC

Three proposed outfall locations:

Outfall 3 to OWC 7

Outfalls 4 and 5 to OWC 5

Item 1.1 Outfall 3

Series of ditches proposed to pick up natural catchment and discharge to OWC7

The only impermeable area is an existing access track (1200m2). Creating formal connection from existing area.

Other impermeable areas drain to Infiltration basin – which does have an overflow for extreme event. Outfall would only be used in event above the 1in100+45%CC event plus a 1in10+CC event. There is enough resilience and factors of safety in system.

WC – overflow does still require a consent under bylaw 3.

It would be useful to show on plan area of impermeable area – this can be provided.

Catchment area discharging to outfall is actually reduced compared to current situation

OWNER: RUK/FER

Item 1.2 Outfall 4 & 5

Outfall 4 picks up natural catchment (intercepted by ditches) – 4.6Ha.

Small stretch of access track (200m2) that will connect into ditch also.

Discharge is mainly greenfield runoff with net reduction in area.

Outfall 5 – larger area (17.8 Ha)

3100m2 + 765m2 of impermeable area drains into outfall

Berms proposed in ditches to attenuate flow in steeper sections to hold flow (within project ditches only and not in OWC5)

FQ – flex MSE will be installed at outfall locations to prevent scour.

OWNER: WC

Item 2 Permanent Works

Item 2.1 Viaduct

Extracts from structures drawing presented, showing piers and distances to OWC

One pier (8a) which is quite close. 6.08m from face of pier to surveyed embankment line, 7.7m to OS embankment line

WC – under Bylaw 10 will require consent under bylaw 10

Have discussed with maintenance operative

FQ – what do we need to do to make sure successful application?

WC – quite straight forward. Main detail needed is distance away and dimension of structure. Would have to go to board for decision. Officers can't make decision. Paul indicated previously that 6m is absolute minimum.

FQ also have outfalls. maintenance access crossing, flood compensatory area

Item 2.1 Maintenance crossing

WC - Would regulate under Section 23 for structure (wouldn't do bylaw 10). But access track either side would be subject to Bylaw 10. Erosion control within the channel would be dealt with under Section 23.

Item 3 Temporary Works in the floodplain

Footprint of temporary works platform presented by FQ

Basically, forming embankment 1.8m high around working area.

Temporary diversion of IDB watercourse.

900mm diameter pipes to cater for alleviating flood risk in the flood plain.

WC – method statement type document outlining everything proposing in the area.

FQ – still finalising – as soon as available will share.

WC – temporary culverting would require consent under Section 23.

OWNER FQ

Item 4 OAB

FQ main objective

Give presentation and MOMs and would like IDB to consider if need anything else to be able to provide us with some sort of statement.

WC to discuss with

Once WC has finalised set of information can provide confirmation of consents

Post meeting note

– additional information added to slide deck showing impermeable areas, permanent works around OWC 5 and long section showing interaction of Flood Compensation Area with OWC 5.

3.2 NCC Operations & Maintenance Email 22/06/2023 –non-return valve at Basins

From:
Sent: 22 **June 2023 16:00**
Subject: RE: NWL-BT Diversion & Basin 5

Hi
As discussed yes happy by return email that the with Detail on drawing for basin 5

Kind regards

Highways Engineer

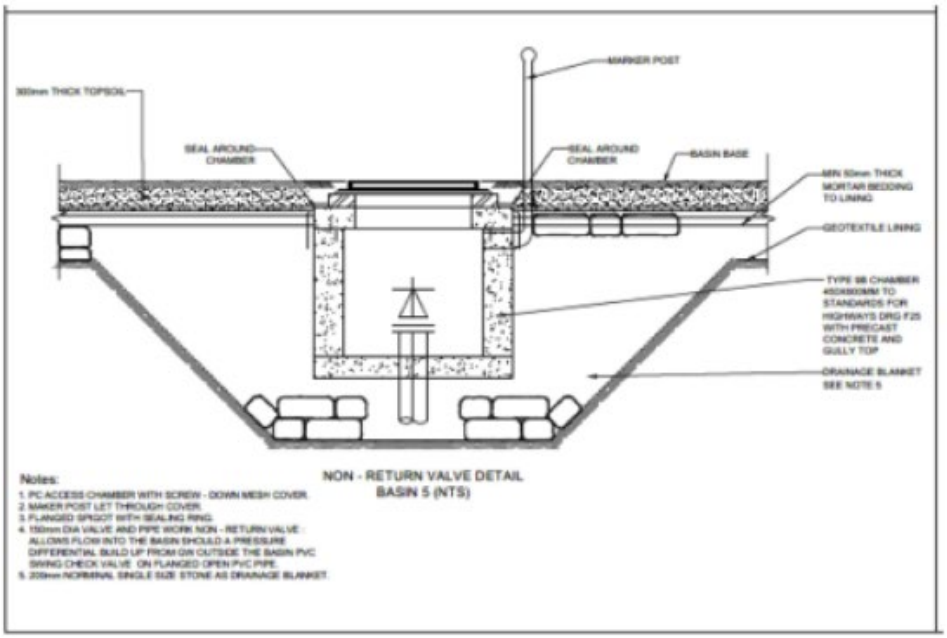
Community and Environment services

Subject: RE: NWL-BT Diversion & Basin 5

Hi

Further to a recent design review meeting held between NCC, the NWL team and Ferrovial Construction we require confirmation by return email that the detail as shown on drawing PK1002-HDG-MLE-DE-DZ-0005 is acceptable to be installed at the bottom of basin 5. This MH will relief the potential pressure coming from high ground water levels.
If you have any queries please do not hesitate to contact --- or myself

Thanks



NON - RETURN VALVE DETAIL
BASIN 5 (NTS)

3.3 NCC Operations & Maintenance 27/07/2023 meeting – Maintenance Regime

AGENDA & MEETING NOTES

PROJECT NUMBER NCCT41793
MEETING DATE 27/07/2023
PROJECT NAME Norwich Western Link
VENUE Teams
CLIENT Norfolk County Council
MEETING SUBJECT Drainage Maintenance – NCC Ops Team

PRESENT -- --

APOLOGIES

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Item 0.1 Introductions

-- introduces himself as drainage lead, taking over from --.

Item 1 Aims of the meeting

To review and agree inspection and maintenance proposals for NWL drainage assets to be captured in the drainage submission for planning – LLFA require these details to approve drainage strategy.

LLFA require more detail on SuDS elements that is currently in the Drainage Strategy. Currently, maintenance regime stated in the Drainage Strategy is a direct copy of the regime submitted for the NDR scheme.

Frequency of maintenance suggested in following slides is based on Transport Asset Management Plan (TAMP), CIRIA “SuDS manual”, The National Highways “Routine and Winter Service Code” (RWSC), and “Network Management Manual”

Item 2 Project Overview / drainage proposals

-- gives overview of project, connections to National Highways A47 scheme, mainline, A1067, sideroads, green bridges and viaduct over Wensum Valley which is SSSI

Drainage features listed - Mostly swales/grassed channels. Ditches draining access tracks.

Outfalls – Infiltration, Attenuation etc. Basins have sediment forebays and shutoff devices (Penstocks).

Following tables document maintenance regimes.

Intention is to get an agreement for maintenance regime. Agree with proposed or come up with an alteration.

Item 2.1 Edge Collection – Swales

Based on guidance from SuDS manual

Table categorised into type of maintenance – Regular, occasional and remedial.

KJ – Grass growing system from spring to summer highlighting the importance of keeping grass levels under control to keep swale functioning.

RP – Current NDR regime involves, weekly inspection with ad hoc work, Gullies – yearly, Rest is ad hoc. -- in charge of NDR maintenance.

RP – All maintenance is as required with weekly inspections

PG – Drainage Strategy based on NCC guidance. LLFA are not happy with the “As required” statement and would like to see frequencies.

HC – Weekly inspection regime covers the “As required”

KJ – Suggests text of “Weekly inspections to confirm what maintenance is required”

KJ – Queries if NDR has similar infrastructure to NWL

HC – Suggests maintenance regime should be tie in with NDR.

MK – Confirms provision of drainage is very similar so suggests regime mimics NDR

PG – Shows Drainage Strategy, mimicking NDR regime that has been rejected by LLFA

RP – most of the drainage proposals involving SuDS should be discussed with -- as he has experience with these on NDR.

Item 2.2 Edge Collection – Surface Water Channels & Filter Drains

Concrete surface water channels

RP - Confirmed NCC are familiar with these channels

RP – Weekly inspections maintenance where required (with at least annual maintenance) as per gully requirement

Item 2.3 Edge Collection – Gullies, Catchpits, CKD, OTE

Gullies

TAMP recommends gully cleaning and emptying annual, biannual, triannual.

Filter drains – For -- to advise.

Manholes & Catchpits as per TAMP

RP – Cleaned as part of gully cleansing – Annually.

KJ – Annual inspection required as per RWSC.

RP – Normal A Roads – Every 6 weeks for general inspections (Not specific pipe network inspections), NDR – Weekly. NWL to follow NDR with weekly general inspections.

CKD – TAMP suggests cleaning annually RP – agrees.

Item 2.4 Conveyance Systems – Pipes, Ditches, Culverts

Over the edge drainage - -- to advise.

Pipes – Cleaned annually.

Ditches – -- to advise.

Piped ditches and culvert – -- to advise.
Ancillary items – -- and Colin Thinnell from bridges team to advise (eg headwalls).

Item 2.5 Attenuation & Pollution Control Systems – Infiltration Basins
-- to advise.

Item 2.6 Attenuation & Pollution Control Systems – Detention Basins
-- to advise.
Item 3 AOB
Call required with --
KJ to send presentation to -- prior via NCC (HC) to this call.
MC – Asks for confirmation of which elements of drainage -- is responsible for.
RP – Confirms SuDS, including swales/grass channels.
HC – To call -- on Monday. Presentation to be issued to NCC via Ferrovial.
MC – NDR not to be mentioned in maintenance manual. “A1270 Broadland Northway” to be used.
OWNER FER/RUK/NCC

3.4 NCC Operations & Maintenance 02/08/2023 meeting – Maintenance Regime

AGENDA & MEETING NOTES

PROJECT NUMBER NCCT41793
MEETING DATE 02/08/2023
PROJECT NAME Norwich Western Link
VENUE Teams
CLIENT Norfolk County Council
RECORDED BY
MEETING SUBJECT Drainage Maintenance – NCC Ops Team Part 2
PRESENT [redacted] – NCC Project Lead
-- (IT)

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Item 0.1 Introductions
Project team introduce themselves to IT

Item 1 Aims of the meeting
To review and agree inspection and maintenance proposals for NWL drainage assets to be captured in the drainage submission for planning – LLFA require these details to approve drainage strategy.
LLFA require more detail on SuDS elements that is currently in the Drainage Strategy. Currently, maintenance regime stated in the Drainage Strategy is a direct copy of the regime submitted for the NDR scheme.
KJ highlights “As required” statement in maintenance plan has been rejected by the LLFA. Frequencies need to be agreed for SUDs elements. At a previous meeting RP had indicated a cyclic regime for non-SUDs elements.

Item 2 Project Overview / drainage proposals
KJ gave overview of project, connections to National Highways A47 scheme,
Drainage features listed - Mostly swales/grassed channels. Ditches draining access tracks, culverts, piped ditches.
Outfalls – Infiltration, Attenuation etc. Basins have sediment forebays and shutoff devices (Penstocks).
Following tables document maintenance regimes. Intention is to get an agreement for maintenance regime. Agree with proposed or come up with an alteration.

Frequency of maintenance suggested in following slides is based on Transport Asset Management Plan (TAMP), CIRIA “SuDS manual”, The National Highways “Routine and Winter Service Code” (RWSC), and “Network Management Manual”.

Item 2.1 Edge Collection – Swales

Wide shallow grass channels. KJ highlights importance of regular maintenance of grass to maintain functionality.

CIRIA SuDS Manual breaks up maintenance schedule into 3 categories:

- Regular maintenance
- Occasional maintenance
- Remedial maintenance

Regular maintenance required actions discussed.

IT ran through drainage problems encountered on NDR:

- No positive outfalls, 25 lagoons, poor drain down at some lagoons - 8 or 9 stand with permanent water, 1-1.5m deep. Hasn’t caused a particular problem. EA haven’t raised as an issue.

- Regular maintenance of lagoons required initially due to runoff from farmers’ fields tipping into lagoons and washing slopes away. Required regular maintenance. French drains introduced to stop this issue.
- Lagoons inspected annually dealing with weeds, ensuring deep water warning signs are still there and visible, general lagoon inspection.

- Swales – working fine. Some detritus during heavy rainfall periods. Easy to inspect.
- CKD issues for roundabouts. Lots of overrunning causing crushing of ACO units, causing drainage issues. Remedial works have been required to outer rings of the roundabouts. Structural grade concrete overrun areas beyond CKDs to hold CKDs in place.

IT – Grass cutting for swales likely once a year but has barely been required on NDR.

Regular maintenance section altered in table – From experience with A1270 Broadland Northway, there have been low requirements for maintenance. During the initial stages of handovers, there will be frequent inspections and remedials undertaken where necessary.

Inspections to be carried out monthly.

Occasional maintenance –Inspect inlets, outlets and slopes annually and following extreme events.

Item 2.2 Edge Collection – Surface Water Channels & Filter Drains

IT – Filter drains on NDR with no maintenance requirement so far.

Regular maintenance - Monthly inspection

Occasional maintenance – KJ questioned if walkovers and pipe inspections have taken place on NDR.

IT – None required on NDR, no issues have been raised.

Item 2.3 Edge Collection – Gullies, Catchpits, CKD, OTE

KJ highlights maintenance had previously been agreed with RP – Weekly inspection, annual cleansing.

CKDs

Discussion currently taken place regarding CKDs. Heavy duty Marshalls CKDs suggested rather than lighter duty ACO kerbdrain units. History around lighter units brought in due to manual handling CDM requirements however smaller units have not been robust in areas where overrun occurs.

Over the edge

Ditches serving maintenance and access tracks.

IT – annual grass cutting, lots of cycle tracks across area with only minor puddling during heavy rain events.

Annual maintenance agreed.

IT – highlights need for regular bridge deck drainage maintenance.

KJ – Underslung pipe. Every 5 years there is a need to inspect the underside of the viaduct. Scaffolding or mobile platforms will be used. This provides an opportunity to inspect the underslung pipe via access points.

IT – Highlights an issue on another project (Postwick) where bridge deck units became blocked and water got between the surfacing and deck and caused the road surface to lift.

IT – Monthly inspections likely to be sufficient as long as they're detailed.

KJ – Monthly walkover inspections of bridge deck units access points agreed. Potential blockage meaning flushing would be required. Cleaning annually as per TAMP. As agreed with RP.

Remedials – Within the same timeframe as 5 yearly structures inspection program.

Item 2.4 Conveyance Systems – Pipes, Ditches, Culverts

IT - No ditches on NDR that are essential to highway functioning. As long as no major ditches in close proximity of mainline, every 5 years should be adequate.

IT – Box culvert on NDR inspected annually, primarily for bat crossing rather than flows.

SC – Highlights culvert at Foxburrow stream that has been oversized for bat crossings.

KJ – Annual inspection, clear culverts where required for bat crossings. Detailed and discussed in Environmental Statement.

HC – NCC is the Technical Approval Authority and are assessing the maintenance requirements of box culverts separately.

Item 2.5 Attenuation & Pollution Control Systems – Infiltration Basins

Monitoring changed from monthly to annual.

IT - Highlights that annual visits have been sufficient with inspections carried out after heavy rainfall periods.

KJ - Every basin has an overflow facility. Cut off ditches to take overland flows. This should help with issues encountered on NDR.

IT - No sediment removal has been required on NDR other than from farmland overland flows.

KJ – Highlights SuDS treatment train in place will help stop sediment build up in basins.

KJ – Explains sediment forebays present on NWL and how they work. Suggests annual inspection required on sediment forebays.

IT – Agrees on annual forebay inspection but indicates more regular inspections will be carried out initially.

APM – Suggests a statement should be added to cover extreme event.

KJ – Is there a maintenance regime for ponds on NDR?

IT – No, remedial work only carried out if the inspection highlights issues.

KJ – Changes table Regular maintenance - “From experience with A1270 Broadland Northway, there has been low requirements for maintenance. During the initial stages of handovers, there will be frequent inspections and remedials undertaken where necessary. It is expected that NWL basins will require less maintenance”.

NWL design should minimise the changes of remedial works required (Overflows, cut off ditches).

Occasional maintenance updated– “From experience with A1270 Broadland Northway, sediment build up in ponds is low and the expectation is that NWL will be similar due to proposed swales”.

IT - Confirms NDR has been running since April 2018.

KJ - Highlights SUDs train, similar design to NDR and should perform in similar way.

KJ - Remedial action frequency has to be “as required” in the tables.

Item 2.6 Attenuation & Pollution Control Systems – Detention Basins

As infiltration basins but with outflow pipe.

KJ – Suggests agreed infiltration basin maintenance is also used for attenuation basins.

PG – Questions if groundwater underdrains are covered within the maintenance regime.

KJ – Underdrains similar to NFD so inspections not feasible. It should be apparent if groundwater underdrains are not functioning during regular inspections.

Item 2.7 Ancillary Items – headwalls, aprons, penstocks, valves

KJ – Inspection of headwalls, aprons etc to take place annually.

IT – On NDR, HydroBrake at Roxham Road is inspected annually.

KJ – Agreed, flow controls to be inspected annually

Item 3 AOB

HC – Suggests we change the “As required” to “As required, subject to regular inspections”.

KJ – Drainage Strategy to be updated to confirm agreed maintenance regime.

OWNER: FER/RUK