

1st September 2020

Colin Ramsay BSR Energy 35 and 35a The Malting Lower Charlton Trading Estate Shepton Mallet Somerset BA4 5QE

Via Email

Our Ref: RMA-LC2036_05 - North Dairy Farm Dorchester FRS

Dear Mr Ramsay,

RE: PROPOSED SOLAR FARM ON LAND AT NORTH DAIRY FARM, PULHAM, DORCHESTER, DT2 7EA - FLOOD RISK SCREENING APPRAISAL

Further to our instruction to establish flood risks associated with a proposed solar farm on land at North Dairy Farm in Pulham, near Dorchester (refer to Figure 1), we have set out in this letter the results of the flood risk screening appraisal. The Site is centred on National Grid Reference (NGR) ST 72960 08065 and has an area of approximately 76 hectares (ha).

The proposed development comprises the construction, operation, management and decommissioning of North Dairy Farm Solar Park, comprising ground-mounted solar panel PV panels together with all associated works, equipment and necessary infrastructure (refer to illustrative layout at Appendix A).

All of the data obtained for this flood risk review has been interpreted in relation to the National Planning Policy Framework (NPPF; February 2019) and the associated Planning Practice Guidance (PPG; October 2019). Historical flood records and other flood sources have been obtained from the Environment Agency (EA) and are provided as Appendix B.

The following subsections set out an evaluation of the key aspects of development on the site in terms of flood risk:

- local hydrology;
- site topography;
- flood zoning and historical flooding;
- surface water flooding;
- fluvial flood levels;
- surface water drainage;
- planning policy considerations;
- other considerations; and
- summary.

The purpose of this screening exercise is to set out the broad flood risk issues for the site with the aim of identifying any major constraints to development.

Local Hydrology

Ordnance Survey (OS) mapping indicates that a number of ordinary watercourses¹ are located within the site which generally flow in a northerly direction. This includes a watercourse with a small catchment area of 1.45 km² which flows through the centre of the site and a watercourse with a small catchment of 1.0 km² which flows along part of the north-eastern site boundary. These two watercourses converge near the northern site boundary and join the River Lydden approximately 155 m to the north of the site.

The River Lydden is located approximately 90 m to the west of the site at its closest point and flows in a north-easterly direction. This watercourse is classified as an ordinary watercourse and has a catchment area of approximately 20 km² at the location of the site. A tributary of the River Lydden is located close to the eastern site boundary; this watercourse has a catchment area of 14 km² at the site location and converges with the River Lydden approximately 0.5 km to the north of the site.

Flood Zoning and Historical Flooding

The site is located within fluvial Flood Zones 1, 2 and 3 which is discussed further below (refer to Figure 2).

The North Dorset District Council Level 1 Strategic Flood Risk Assessment (SFRA; JBA Consulting, 2018) identified that the urban area of Wonston, located approximately 0.7 km to the east of the site has three recorded flood events which are assumed to be due to fluvial flooding from a tributary of the River Lydden.

The EA's historic flood map indicates that there are no historic flood records for the site or surrounding area.

The SFRA identifies that the site has the 'potential for groundwater flooding to occur at surface' which is related to the River Lydden and its tributaries. Areas with the 'potential for groundwater flooding to occur at surface' correspond to the presence of River Terrace deposits identified by British Geological Survey (BGS) online Geology of Britain Viewer and the River Lydden. However, any groundwater flooding is likely to be shallow and would not adversely the proposed development.

Based on a review of other sources of flooding (such as reservoirs and sewers), it is considered that flood risks from these are low and, therefore, they are not considered further.

Surface Water Flooding

The EA's surface water flood risk map (refer to Figure 3) shows that the majority of the site has a very low surface water flood risk (i.e. less than 0.1% annual probability).

Generally, the site has a very low risk of surface water flooding; however, some areas have a low, medium or high risk of surface water flooding as summarised below:

- the north-eastern and the north-western site boundaries, where the extent appears to be interlinked with fluvial flooding which is better defined by the EA's Flood Zones 2 and 3;
- a flow path along the corridor of the ordinary watercourse shown on OS mapping, which flows south to north through the site; and
- areas of isolated ponding of surface water.

It is proposed to avoid the areas of medium and high surface water flood risk associated with the watercourses or a flowpath where possible. However, the solar panels would be elevated on framework significantly above ground level, and, therefore, would not impede any surface water flow paths or displace any ponding of surface water.

¹ Ordinary watercourse is defined by the EA as any watercourse including every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a main river.

Fluvial Flooding

The EA's flood map for planning (refer to Figure 1) indicates that the majority of the site is located within Flood Zone 1 (low risk) with some areas along parts of the northern boundary within Flood Zones 2 and 3 (medium and high risk, respectively). The flood zones for the site are associated with the River Lydden and its tributaries.

Flood Zone 1 is defined as land with little or no flood risk (an annual exceedance probability [AEP] of flooding of less than 0.1%). Flood Zone 2 is defined as having a medium flood risk (an AEP of between 0.1% and 0.5% for tidal areas or 0.1% and 1.0% for rivers). Flood Zone 3 is defined as high risk (with an AEP of greater than 0.5% for tidal areas or greater than 1.0% for rivers).

Detailed flood data was requested from the EA; however, this confirmed that they do not have any modelled flood levels for the watercourses and the flood map has been generated using the EA's national generalised model (JFLOW); the EA's response is included as Appendix B.

Design Considerations

It is proposed to locate the solar panel arrays within Flood Zone 1 (refer to Figure 2). This is considered to be a conservative approach given that the EA's JFLOW model commonly overestimates fluvial flood extents.

The access/egress route for the site is located within Flood Zones 2 and 3. However, it is anticipated that personnel will only be on-site during the construction phase of the proposed development and for occasional maintenance visits once construction has been completed. There will be no other personnel present at the site for the majority of the operational lifetime of the development. The developer and maintenance contractor would sign up to the EA's flood warning service for the local area. This would ensure that all personnel would have sufficient time to leave the site or reschedule their planned visits.

Future Risk with Climate Change

The operational lifetime of the development is 35 years and, therefore, the climate allowances for the 2040 to 2069 timescale is appropriate. Based on this operational timescale, the latest guidance on climate change states that for 'essential infrastructure' development within the South West river basin district, climate change could increase river flows by 40% for the upper end allowance and by 50% for the High++ allowance.

It is not possible to define the 1 in 100 year flood extent with climate change without re-running the JFLOW model; however, it is considered acceptable to use the Flood Zone 2 extent as a proxy, given the 'essential infrastructure' classification and the operational lifetime of 35 years. Therefore, all of the proposed solar panels are located outside of Future Flood Zone 3.

Surface Water Drainage

Solar Arrays

It is not considered necessary to provide SuDS for the proposed solar panel arrays. Cook and McCuen (2013) used modelling to demonstrate that solar panels do not have a significant effect on runoff volumes, peaks or time to peak if grass cover is well maintained underneath panels and between rows. The report also notes that although the panels could concentrate runoff onto the ground, this only has the potential to cause erosion if it falls directly onto bare ground or a gravel surface. On this basis, it concluded that solar farms only significantly change the hydrologic response if gravel is placed under panels or if patchy or bare ground is created between rows.

The Cook and McCuen (2013) study notes that grass cover can deteriorate if it is not sufficiently maintained or if it is eroded by vehicle traffic. As such, it is recommended that the grass cover is well maintained underneath panels and between rows to avoid patchy grass or bare ground. It is understood that the site will be permanently vegetated, and it is recommended that grass is inspected and maintained at least twice a year, which is considered an appropriate level of mitigation.

It is recommended that during maintenance, any patchy grass or bare ground is re-seeded. During construction it is recommended that vegetation disturbance should be minimised as much as possible and any bare ground resulting from construction should be re-seeded.

This position is also supported by research undertaken by Wallingford HydroSolutions² (an industry leading consultancy which often advises the EA) and is stated in BRE's planning guidance for large scale solar farms.

Other Areas (roads and containers)

The majority of the proposed roads and tracks will be constructed of a permeable material (e.g. gravel); therefore, there would be no increase in runoff from these areas. A sub-station access track with a Type 1 top layer is required as a statutory requirement of the Distribution Network Operator, SSE and, therefore a swale will be located adjacent to the track to provide sufficient storage for all events up to and including the 1 in 100 year event with climate change. As infiltration testing has not been undertaken at this stage, the drainage strategy will be based on a discharge into one of the ordinary watercourses within the site at greenfield rates.

The inverter buildings will be located in storage containers above a 300 mm sub-base formed of permeable material (i.e. gravel) or on a concrete base which would be surrounded by a gravel trench. The permeable sub-base or gravel trench would receive surface water runoff from the containers or cabins and would promote infiltration to the ground. This will mimic the existing greenfield surface water runoff arising from the Site and ensure that runoff rates are not increased post-development. It is noted that this approach has been accepted on other recent solar farm developments (e.g. application reference 2/2019/0850/PAEIA Dorset Council).

It is understood that the sub-station is formed by a gravel base which will promote infiltration and will also mimic the existing greenfield surface water runoff arising from the Site.

The Lead Local Flood Authority (LLFA) will be consulted to confirm the surface water drainage approach; however, based on the above mitigation, it is concluded that the proposed development will not increase flood risk to the Site itself or elsewhere.

Planning Policy Considerations

Table 2 of the PPG sets out a schedule of land uses based on their vulnerability or sensitivity to flooding. Solar farms are classified as 'essential infrastructure'. Referring to Table 3 of the NPPF PPG, 'essential infrastructure' land uses are considered appropriate in Flood Zones 1, 2, 3a and 3b, subject to passing the Sequential Test.

However, all built development has been located on land located within Flood Zone 1 and all forms of development are acceptable within Flood Zone 1, without the need to pass the Sequential Test. Furthermore, the solar farm needs to be in its proposed location due to the available capacity in the national grid in the area, owing to the existing onsite 132kV overhead lines. Given the Site area of 76 ha, it is concluded that no other suitable sites in the vicinity of the electricity distribution station are reasonably available which have a lower risk of flooding. As such, it is considered that the Sequential Test should be passed.

² https://www.hydrosolutions.co.uk/2017/12/11/here-comes-the-sun/

Therefore, on the basis of land use vulnerability, the development should be deemed appropriate in planning policy terms in its proposed location.

Other Considerations

It is recommended that an appropriate buffer is provided from the top of the bank of the watercourses in order to ensure access for maintenance. The buffer zone must be 'undisturbed' by development including fences, footpaths and formal landscaping.

Summary

The key points of this flood risk screening appraisal are as follows:

- the majority of the site is located within Flood Zone 1 (low risk) with some areas within Flood Zones 2 and 3 (medium and high risk, respectively) associated with the River Lydden and its tributaries;
- the SFRA identifies that the site has the 'potential for groundwater flooding to occur at surface' which is related to the River Lydden and its tributaries. However, groundwater flooding is likely to be shallow and would not adversely affect the proposed development;
- the majority of the site has a very low surface water flood risk with some areas of low to high surface
 water flood risk associated with watercourses and isolated ponding. However, the solar panels would
 be elevated on framework significantly above ground level and, therefore, would not impede any surface
 water flow paths or displace any ponding of surface water;
- it is not considered necessary to provide SuDS for the proposed solar panel arrays. Cook and McCuen (2013) demonstrated that solar panels do not have a significant effect on runoff volumes, peaks or time to peak if grass cover is well maintained underneath panels and between rows. Therefore, it is proposed to maintain the grass cover to prevent areas of bare ground and erosion occurring;
- an impermeable substation access track is required as a statutory requirement of the Distribution Network Operator and, therefore, as infiltration testing has not yet been undertaken, a swale will be located adjacent to the track to provide sufficient storage for all events up to and including the 1 in 100 year event with climate change. The swale will discharge into one of the ordinary watercourses within the site at greenfield rates;
- the inverter buildings will be located in storage containers above a 300 mm sub-base formed of permeable material (i.e. gravel) or on a concrete base which would be surrounded by a gravel trench.
 The permeable sub-base or gravel trench would receive surface water runoff from the containers or cabins and would promote infiltration to the ground;
- it is understood that the sub-station is formed by a gravel base which will promote infiltration and will also mimic the existing greenfield surface water runoff arising from the Site;
- it is recommended that an appropriate buffer is provided from the top of the bank of the watercourses in order to allow access for maintenance.
- it is proposed to locate all of the proposed solar panel arrays in Flood Zone 1 which is considered to be
 a conservative approach given that the EA's JFLOW model commonly overestimate fluvial flood
 extents;
- 'essential infrastructure' land uses, such as the proposed solar farm, are considered appropriate in Flood Zones 1, 2, 3a and 3b; and
- the access/egress route for the site is located within Flood Zones 2 and 3. However, it is anticipated that personnel will only be onsite during the construction phase and for occasional maintenance visits.

I trust that the enclosed information is helpful. Please do not hesitate to get in touch should you have any further questions or if you require any further input from ourselves.

Yours sincerely

Nick Yeo

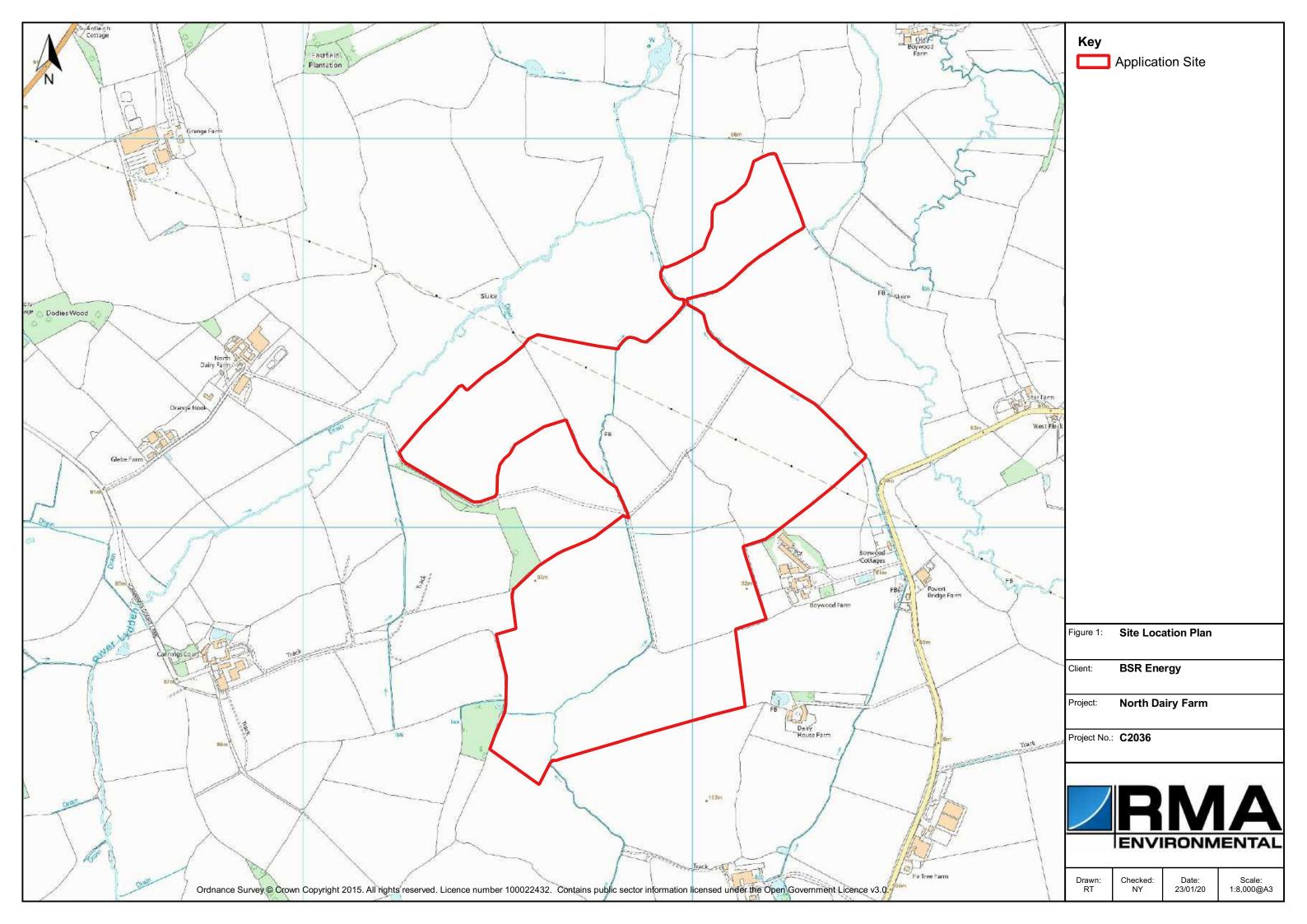
Environmental Consultant

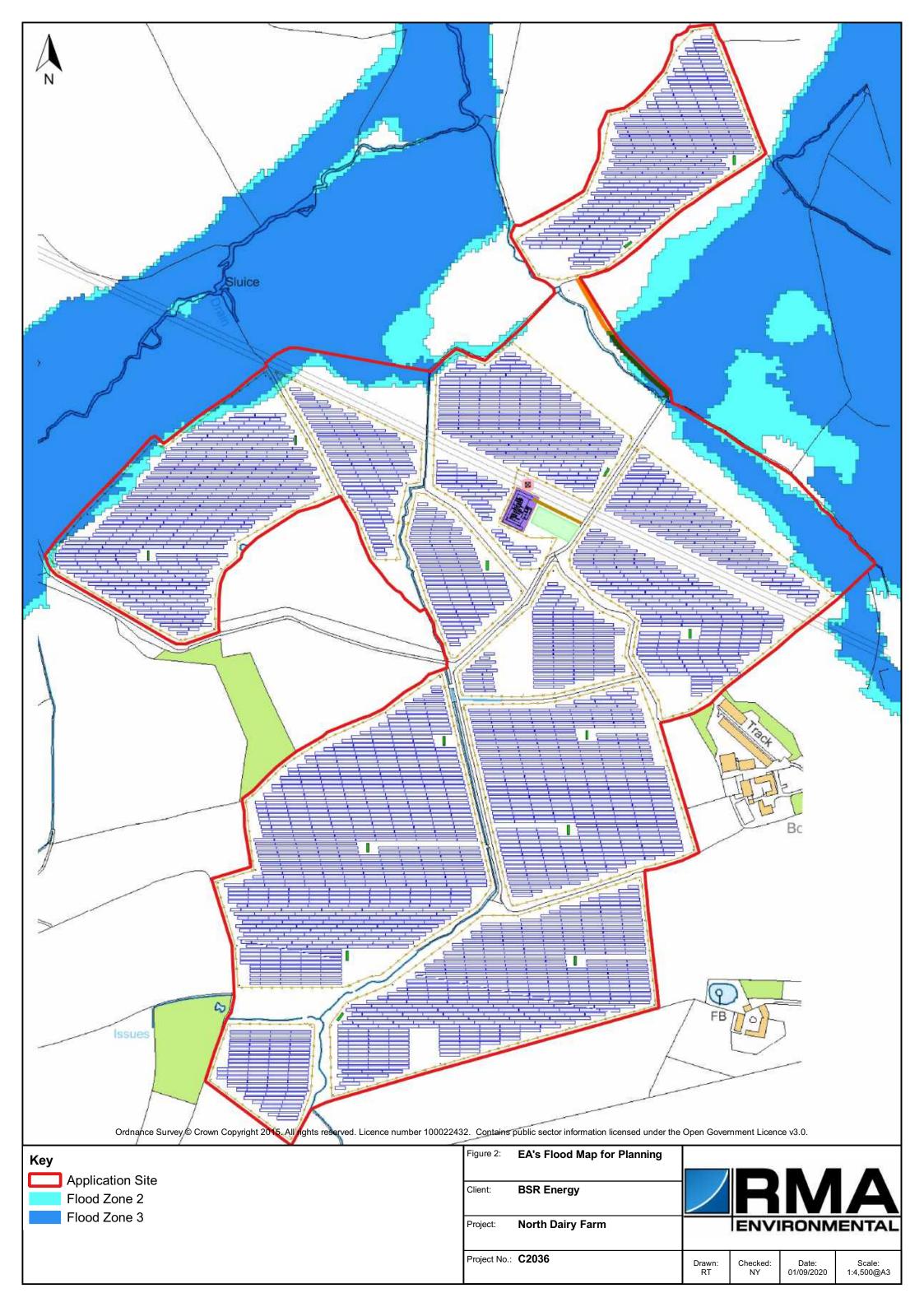
Encs: Figure 1: Site Location Plan

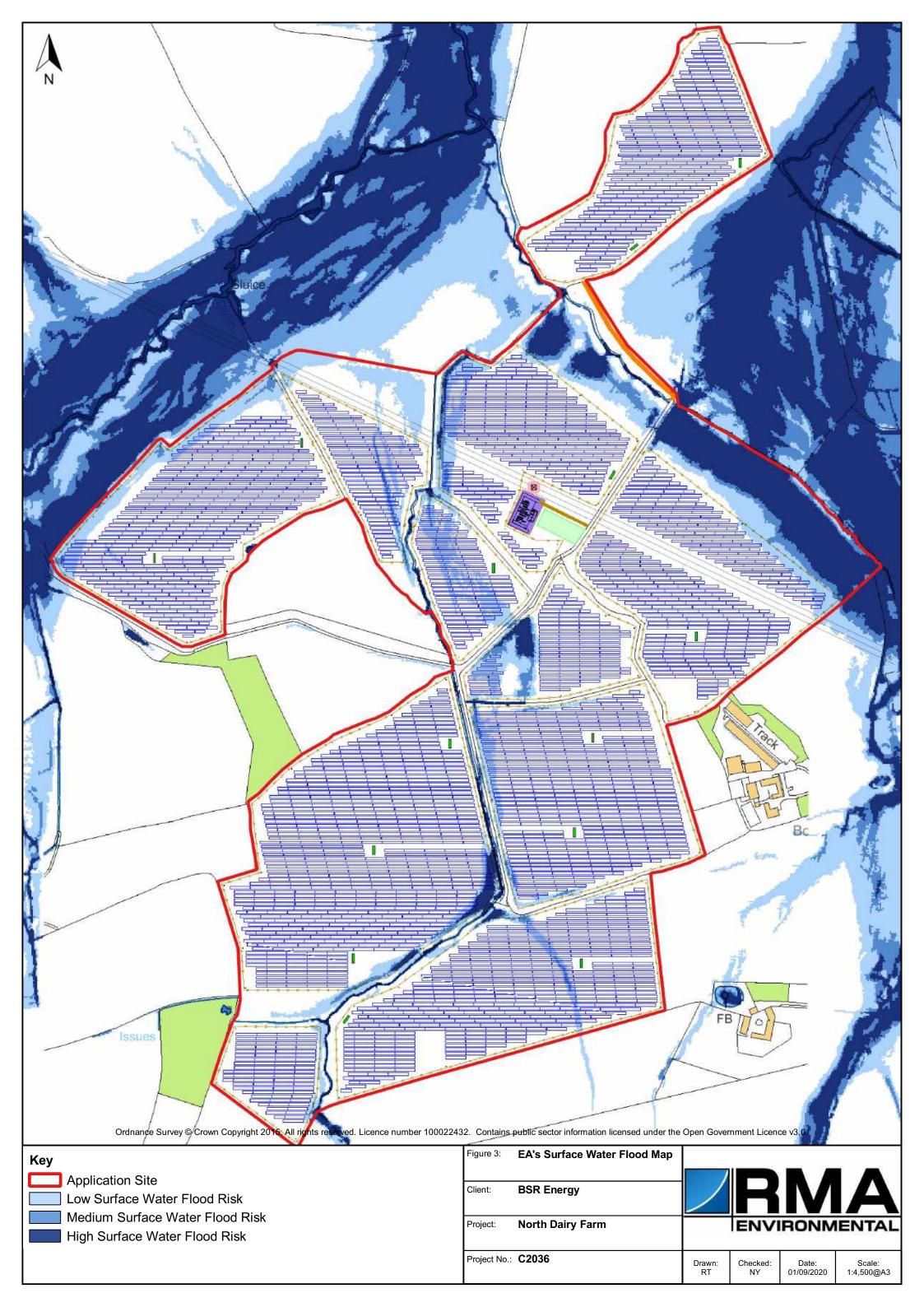
Figure 2: EA Flood Map for Planning EA's Surface Water Flood Map

Appendix A: Illustrative Layout Appendix B: EA Flood Data

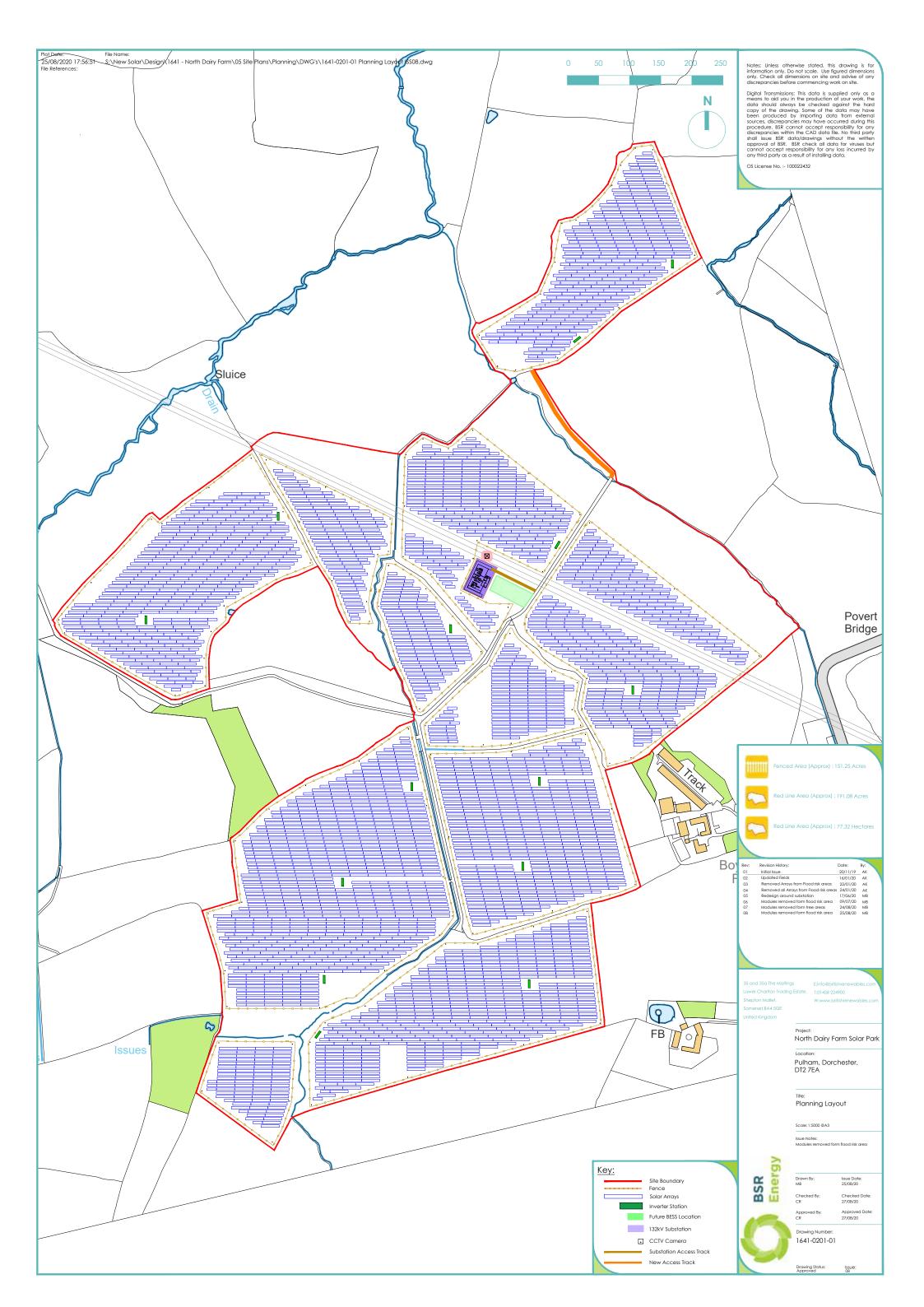
Figures







Appendix A: Illustrative Layout



Appendix B: EA Flood Data

creating a better place



Nick Yeo Our ref: 153497-WX

RMA Environmental Your ref:

<u>nick.yeo@rma-environmental.co.uk</u> **Date:**9 January 2020

Dear Nick

Thank you for your enquiry which was received on the 6th December 2019.

Abstract

| Name | Product 4 |
|-------------------------|--|
| Description | Detailed Flood Risk Assessment Map for North Dairy Farm, Pulham, Dorchester, DT2 7EA |
| Information Warnings | The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply. |
| Attribution | Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2019 Ordnance Survey 100024198. |

Flood Map for Planning

The Flood Map for Planning is now classed as Open Data. It can be downloaded free of charge under an open data licence from the following weblink: https://data.gov.uk/publisher/environment-agency

If you search for the 'flood map for planning' in the search box the following datasets will be available for you select and download the data:

- Flood Map for Planning (Rivers and the Sea) Flood Zones 2 and 3
- Flood Map for Planning (Rives and Sea) Areas Benefiting from Defences
- Flood Map for Planning (Rivers and Sea) Flood Storage Areas
- Flood Map for Planning Spatial Flood Defences (without Standard attributes)
- Recorded Flood Outlines
- Historic Flood Map
- · Risk of Flooding from Surface Water Extent for:

Customer & Engagement, Wessex

Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS

Phone: 03708 506 506

Email: wessexenquiries@environment-agency.gov.uk

www.environment-agency.gov.uk

- → 3 percent annual chance
- → 1 percent annual chance
- → 0.1 percent annual chance

If you have requested this information to help inform a development proposal, then you should also note the detail in the attached advisory text on the use of Environment Agency Information and Further Guidance for FRAs.

Flooding history

We no longer produce pdf copies of the Historic Flood Map. This information is available to search select, and download free of charge as part of the Government's 'open data' as

- Recorded Flood Outlines
- the Historic Flood Map

These are GIS layers and can be download from: https://data.gov.uk/publisher/environment-agency

If you have requested this information to help inform a development proposal, then you should also note the detail in the attached advisory text on the use of Environment Agency Information and Further Guidance for FRAs.

Strategic Flood Risk Assessment (SFRA)

When preparing a FRA to support a development proposal in this location you should refer to Dorset County Council's SFRA Report Level 2 via https://www.dorsetforyou.gov.uk/planning-buildings-land/planning-policy/east-dorset/local-development-framework/evidence-base-studies/strategic-flood-risk-assessment-level-2-christchurch.aspx

Planning

If you have questions regarding the planning nature of your enquiry, or require advice on floor levels, please contact our Sustainable Places team on NWX.SP@environment-agency.gov.uk. Please be aware that we now charge for planning advice when consulted on pre-application enquiries. This new approach provides advice to developers in two ways. Firstly there is the provision of 'free' advice available to everyone where we give a preliminary opinion on a proposed development. This sets out the environmental constraints together with any issues this raises for us. Should you wish us to review in detail any of these issues then we can do this through a chargeable scheme aimed at recovering our costs.

Flood Levels

Fluvial flood levels and depths

The site is adjacent to an ordinary watercourse (non main river) so we have no modelled flood level data for the river channel or floodplain for this location. However, we have included maximum fluvial depth from our National Broadscale model (JFLOW):

Customer & Engagement, Wessex

Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS

Phone: 03708 506 506

Email: wessexenquiries@environment-agency.gov.uk

www.environment-agency.gov.uk

1000 year: 83.91mAoD 100 year: 83.80mAoD

If you intend undertaking a FRA for a planning application using climate change flood level information supplied in this letter, you should consider whether it is appropriate in light of a range of potential allowances for fluvial flood flow now advised in curent planning guidance on 'Flood risk assessments: climate change allowances'.

The relevant guidance is available at the following website address: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Environmental Permit for Flood Risk Activities

In addition to any other permission(s) that you may have already obtained e.g. planning permission, you may need an environmental permit for flood risk activities (formerly known as Flood Defence Consent prior to 06 April 2016) if you want to do work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

For further information and to check whether a permit is required please visit: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

For any further advice, please contact your local Environment Agency Office, at bridgwater.frap@environment-agency.gov.uk.

Further Information

We advise that you also contact the flood risk management team at Dorset County Council on email: floodriskmanagement@dorsetcc.gov.uk or at County Hall, Colliton Park, Dorchester, DT1 1XJ, Telephone 01305 221000 (Main phone line) as they may be able to provide further advice with respect to localised flooding and drainage issues.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for FRAs:

https://www.gov.uk/planning-applications-assessing-flood-risk

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Customer & Engagement, Wessex

Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS

Phone: 03708 506 506

Email: wessexenquiries@environment-agency.gov.uk

www.environment-agency.gov.uk

We hope you find this information helpful and it is provided subject to the guidance below, which we strongly recommend you read.

Yours sincerely

Corinne Moyse

Customer & Engagement, Wessex

Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS

Email: wessexenquiries@environment-agency.gov.uk

Telephone number: 03708 506 506

Enc: Use of Environment Agency Information for Flood Risk Assessments (below)

Customer & Engagement, Wessex

Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS

Phone: 03708 506 506

Email: wessexenquiries@environment-agency.gov.uk

www.environment-agency.gov.uk

Use of Environment Agency Information for Flood Risk Assessments (FRAs)

Important

Use of Environment Agency data: you should note that

- 1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but the use of Environment Agency information does not constitute such an assessment on its own.
- 2. As part of your data request, we have provided all of the modelled data we hold for your location. Please note that some of our modelled information may have been produced for purposes other than for flood zone generation. This may mean that some of the modelled data you have been provided with has a lower confidence level, and has not been used in producing our flood map, nor definitively reflects the predicted flood water level at the property/development site scale. To check the suitability of the use of this information in your FRA please contact your local Partnership & Strategic Overview (PSO) team.
- 3. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. The information produced by the Local Planning Authority and the Lead Local Flood Authority (LLFA) may assist in assessing other sources of flood risk.
- 4. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection.
- 5. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your Local Planning Authority.

Pre-Planning Advice from the Environment Agency

If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:

Pre-application Preliminary Opinion:

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Pre-application Charged Service:

https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions

Customer & Engagement, Wessex

Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS

Phone: 03708 506 506

Email: wessexenquiries@environment-agency.gov.uk

www.environment-agency.gov.uk

Depending on the enquiry we may also provide advice on other issues related to our responsibilities, including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

Flood Risk Assessment (FRA) Guidance

You should refer to the Planning Practice Guidance of the National Planning Policy Framework (NPPF) and the Environment Agency's Flood Risk Standing Advice for information about Flood Risk Assessment (FRA) for new development in the different Flood Zones. These documents can be accessed via:

National Planning Policy Framework Planning Practice Guidance:

http://planningguidance.planningportal.gov.uk/

Environment Agency advice on FRAs:

https://www.gov.uk/flood-risk-assessment-for-planning-applications#when-to-follow-standing-advice

https://www.gov.uk/government/publications/planning-applications-assessing-flood-risk

Customer & Engagement, Wessex

Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS

Phone: 03708 506 506

Email: wessexenquiries@environment-agency.gov.uk

www.environment-agency.gov.uk