

EWR Alliance

Flood Risk Assessment

Compound A1, Land North East of Charbridge Lane



Compound A1, Land North East of Charbridge Lane

Flood Risk Assessment

Network Rail

22 March 2019

Notice

This report was produced by the Alliance for the specific purpose of the Alliance

This report may not be used by any person other than the Alliance without the Alliance's express permission. In any event, Alliance accepts no liability for any costs, liabilities or losses arising as a result of the use of or reliance upon the contents of this report by any person other than the Alliance.

Document History

JOB NUMBER: 133735			DOCUMENT REF: 133735-EWR-REP-EEN-000180			
Revision	Purpose Description	Originated	Checked	Reviewed	Approved	Date
B01	For issue	L. Willis	A. Cox	A. Rose	J. Jefferies	22/3/19



Contents

Section	Page
Executive Summary	iv
1. Introduction	1
Background	1
Report Scope	1
The Site	1
Proposed Works	2
Data Limitations	3
Flood Risk Planning Policy	3
2. Current Site Flood Risk	7
History of Flooding	7
Fluvial Flood Risk	7
Tidal Flood Risk	10
Groundwater Flood Risk	10
Overland/Surface Water (Pluvial) Flooding	10
Canals	11
Reservoirs	12
Sewers	12
3. Drainage Strategy	13
4. Conclusions and Recommendations	14

Figures

Figure 1-1 Site location	2
Figure 1-2 Environment Agency Flood Map for Planning (Rivers and Sea)	4
Figure 2-1 Modelled 1% annual chance event (including 70% climate change allowance) flood extents	8
Figure 2-2 Modelled 1% annual chance event (including 70% climate change allowance) flood extents – north west Compound boundary	9
Figure 2-3 RoFSW Flood Maps	11

Executive Summary

This Flood Risk Assessment (FRA) is compliant with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. It has been produced on behalf of the East West Rail (EWR) Alliance in support of a planning application for the proposed Compound A1, Charbridge Lane.

The site is located on the outskirts of Bicester, to the west of the site is the urban area of Bicester and a number of industrial units and to the north and east of the site is in an open agricultural area.

The site is made up of a large field and the field is generally flat sloping gently southwards between 72m and 69m OD. The field is bound by a hedgerow and there are three mature trees within the field. The site is adjacent to Bicester Road on the west and immediately west of Bicester Road is an area of allotments. The eastern boundary is formed by a hedgerow and to the east of the site is a large field. The OXD line forms the southern boundary of the site, with a hedgerow along the railway line. The Langford Brook flows south west, 85m from the northern boundary of the Compound.

The Site is not shown to be at risk of reservoir or canal flooding and is shown to be outside historical flood extents, as shown in the Environment Agency flood map layers. The Site is indicated to have no risk from groundwater flooding, as shown in the JBA Groundwater Flood Map (National). The entire Site is located within Flood Zone 1 on the Flood Map for Planning from the Environment Agency.

Table 2 of the Planning Practice Guidance classifies land use in relation to flood risk. Using these classifications, the proposed compound would be defined as 'less vulnerable'. Table 3 of the Planning Practice Guidance identifies that a 'less vulnerable' development within Flood Zone 1 is considered to be 'appropriate'.

In compliance with the requirements of NPPF, the proposed works can proceed without being subject to significant flood risk and with the proposed drainage measures the works will not increase flood risk to the wider catchment.

In conclusion:

- The proposed Compound has been designed to avoid the fluvial flood risk predicted by the hydrological and hydraulic modelling results. The model results have demonstrated that the entire proposed Compound area is outside of the floodplain (1% annual chance event including 70% climate change), therefore a CFSA is not required for the temporary Compound.
- Flood risk will not pose a risk to the operational activities. Access and egress is possible in the 1% annual chance event (including climate change).
- The proposed development lies within Flood Zone 1 and is therefore appropriate in accordance with the NPPF.
- The flood outlines have been used to inform the Compound boundary and layout. A Drainage Strategy and Flood Management Plan will be developed to manage the surface water runoff on Site.
- Any impacts will be temporary, as the construction compound will be removed on completion of the works and ground levels restored to pre-development conditions.

1. Introduction

Background

The East West Rail (EWR) Alliance has prepared a Flood Risk Assessment (FRA) on behalf of Network Rail for Compound A1 on land north east of Charbridge Lane.

This assessment supports the planning application for the proposed Compound within the Site. The Site is approximately 4.1 hectares (ha) in size. The National Planning Policy Framework (NPPF) states that for sites greater than one hectare a FRA is required to support the planning application.

Report Scope

This FRA is based upon available existing information including publicly available information, to confirm the extent of flood risk at the Site.

The FRA report includes a review of site information and the likely extent of any flood risk at the Site; identification of whether there are any flooding or surface water management issues related to the development that may warrant further consideration; identification and scoping of other flood risks as required e.g. groundwater flooding; and determining whether further assessment is required. Indicative hydrological and hydraulic modelling has been undertaken for this site which is reported in this report. Reference is also made to the Aylesbury Vale District Council (AVDC) Strategic Flood Risk Assessment (SFRA) (2017).

The FRA considers climate change and informs the application of the sequential approach if applicable.

The Site

A site location plan is provided in Figure 1-1. Compound A1 lies on the north side of the OXD line, approximately 2km east of the centre of Bicester and is currently a large field that gently slopes southwards with an elevation of between 72m and 69m above Ordnance Datum (AOD).

The site is located on the outskirts of Bicester, to the west is the urban area of Bicester and a number of industrial units, to the north and east of the site is in an open agricultural land. The site is also located immediately to the east of Bicester Road (with an associated roundabout to the north west site with spurs for Bicester Road and the A4421).

The eastern boundary is formed by a hedgerow and to the east of the site is a large field. The OXD line forms the southern boundary of the site, with a hedgerow along the railway line. The Langford Brook flows south west, approximately 85m from the northern boundary of the Compound. Bicester Airfield Local Wildlife Site (LWS) is located 520 m north of the site at its closet point.

The site can therefore, be defined as agricultural land with receptors directly adjacent to the Site.



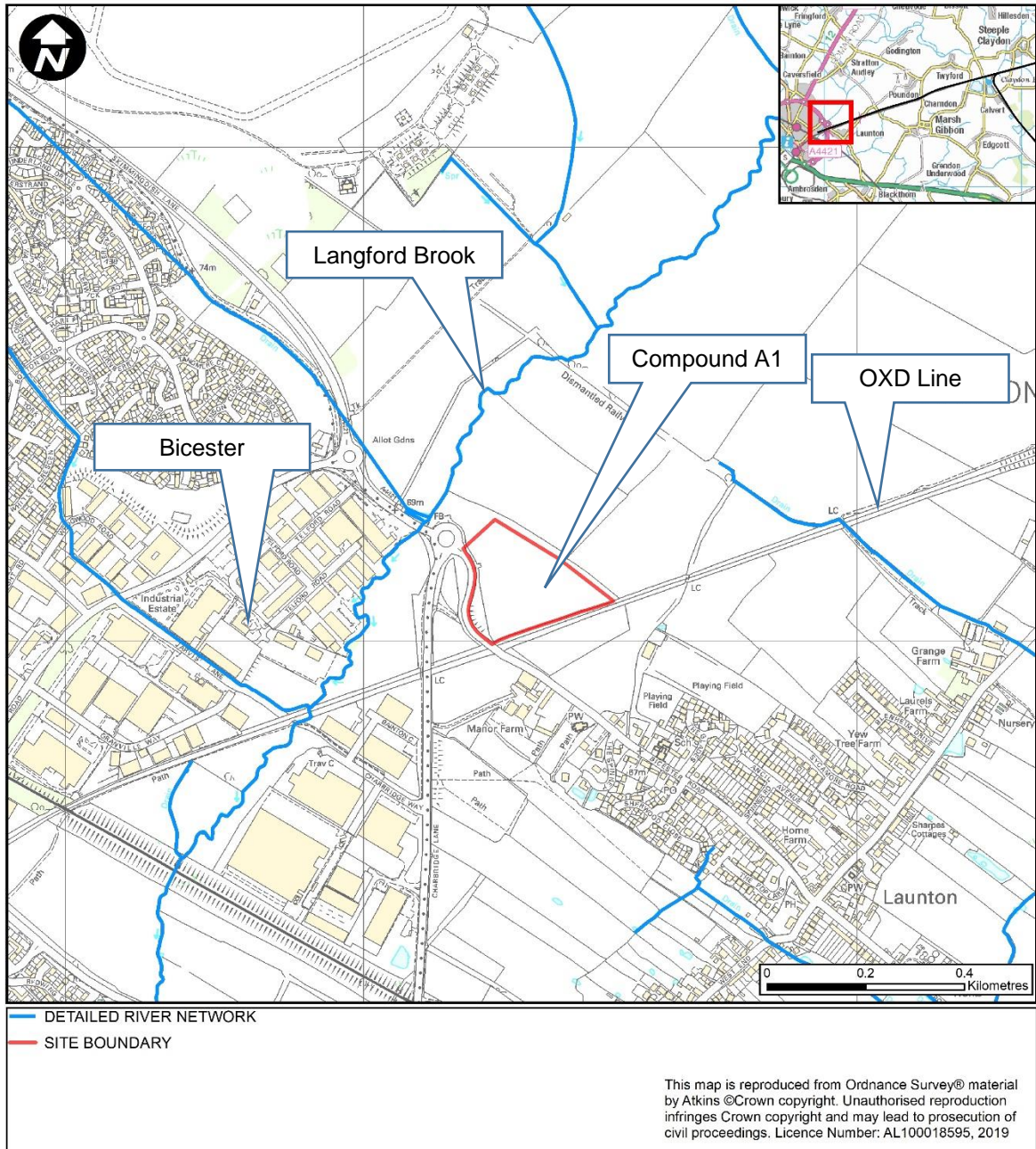


Figure 1-1 Site location

Proposed Works

Drawing 133735_2A-EWR-OXD-XX-DR-L-019011 shows the proposed layout of Compound A1.

Access to the site will be from Bicester Road and will involve formalising an existing farm access on the western boundary. An access to the OXD line will also be created in the south eastern corner of the site to allow construction access to the rail corridor.

The site will include 42 units for office accommodation and welfare facilities in three storeys of fourteen as well as car parking spaces for staff and operatives. Excavated topsoil and subsoil from the compound site will be stored in the southern part of the site, with the laydown area for construction materials and plant in the lower, southern part of the site, closest to the railway.

The HGV route to the Compound will be from the A4421, along which there is no requirement for any highways improvement works associated with this proposal.

Further details are provided in the planning drawings.

Data Limitations

The report is based on findings from publicly available information and indicative hydraulic modelling. The report is based on the following information:

- Drawing 133735_2A-EWR-OXD-XX-DR-L-019011.
- Environment Agency flood risk information.
- AVDC SFRA Level 1 and SFRA Level 2.
- JBA Groundwater Flood Map (National).
- Local Press Flood Reports / Anecdotal Evidence.
- British Geological Survey Solid and Drift Maps.

Flood Risk Planning Policy

The NPPF sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Planning Practice Guidance is also available online.

The Planning Practice Guidance sets out the vulnerability to flooding of different land uses. It encourages developments to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off-site to the wider catchment area.

The Planning Practice Guidance also states that alternative sources of flooding, other than fluvial (river flooding), should also be considered when preparing a FRA, such as groundwater, fluvial and infrastructure.

This FRA is written in accordance with the NPPF and the Planning Practice Guidance.

Flood Zones

The Flood Map for Planning has been prepared by the Environment Agency. This identifies areas potentially at risk of flooding from fluvial or tidal sources. An extract from the mapping is included as Figure 1-2. Note that areas not in Flood Zone 2 or 3 are by default Flood Zone 1. These zones are defined in the NPPF as follows:

- Flood Zone 1 (Low Probability) comprises land assessed as land having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
- Flood Zone 2 (Medium Probability) comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.
- Flood Zone 3 (High Probability) comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

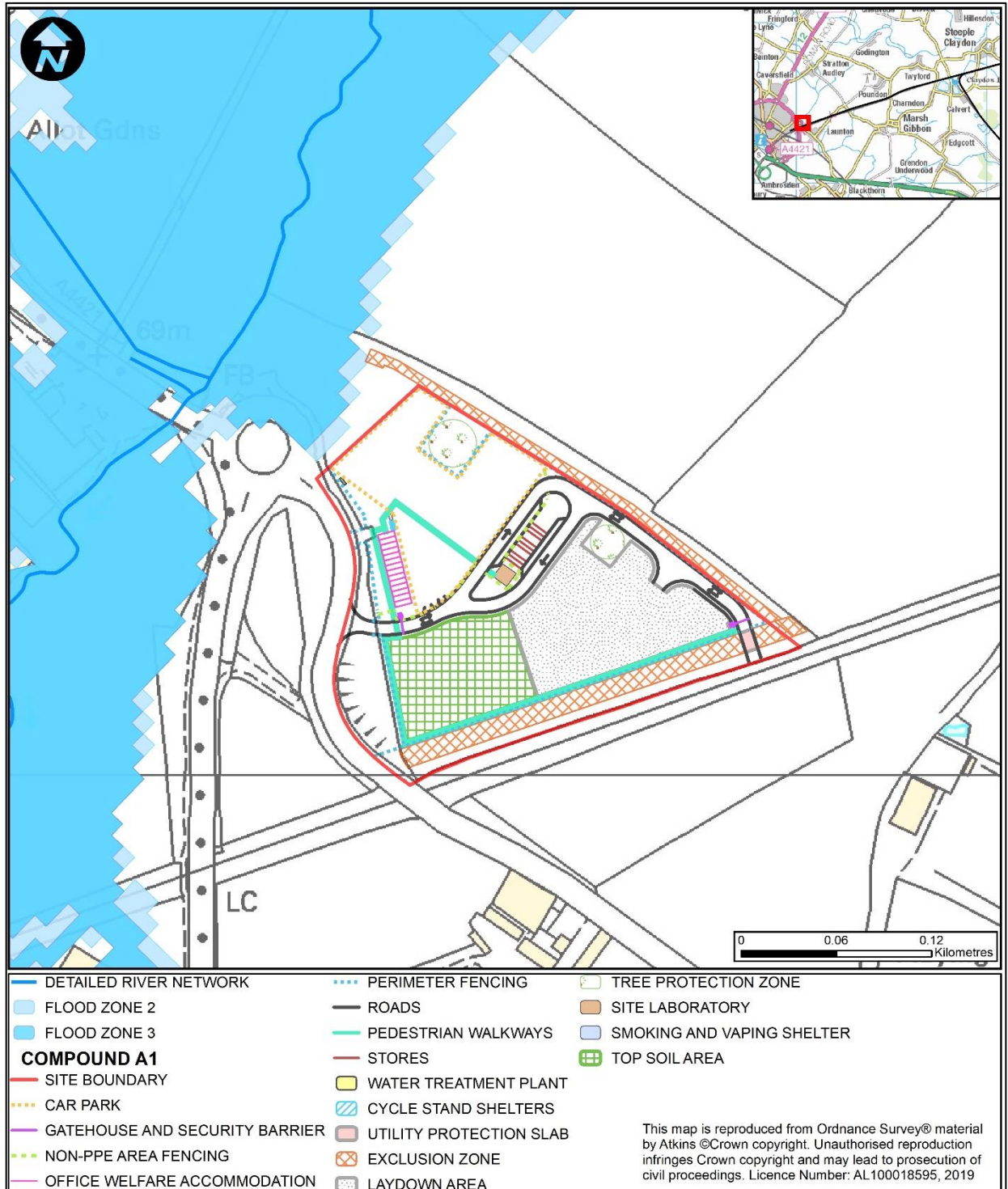


Figure 1-2 Environment Agency Flood Map for Planning (Rivers and Sea)

Environment Agency (EA) Flood Zone maps show that Compound A1 falls within the Environment Agency Flood Zone 1 (although it is approximately 20m from Flood Zone 3). Environment Agency's

Risk of Flooding from Surface Water (RoFSW) maps show small areas of surface water floodplain within Compound A1 (see Figure 2.3).

Table 2² of the Planning Practice Guidance classifies land use in relation to flood risk. Using these classifications, the proposed compound would be defined as 'less vulnerable' based on the flood risk vulnerability classification.

Table 3³ of the Planning Practice Guidance identifies that a 'less vulnerable' development within Flood Zone 1 is considered to be 'appropriate' and therefore passes the sequential test.

Other Relevant Policy and Guidance

Strategic Flood Risk Assessment (SFRA)

AVDC SFRA⁴ was undertaken in 2017 to provide essential information on local flood risk, taking into account climate change that will allow AVDC to understand the risks across the area.

The findings of the SFRA have been used to inform this report and are referred to in the relevant sections within this report and key points have been summarised below:

- Within the Aylesbury Vale District, the predominant sources of flood risk are from fluvial and surface water run-off.
- Aylesbury Vale District regularly suffers from flooding. In general, the fluvial flood risk across the Aylesbury Vale District is high with large extensive floodplains being a substantial feature of the rural landscape. Flooding from the land caused by overland flow or as a result of sudden intense downpours has led to wide scale flooding of varying degrees across Aylesbury Vale.
- The SFRA also identifies that sewer flooding is not considered to be an issue within the Aylesbury Vale District.
- The SFRA recommends that to minimise surface water flooding, water should be managed on the surface through the appropriate application of Sustainable Drainage Systems (SuDS).

Thames Catchment Flood Management Plan (CFMP) 2009

The CFMP⁵ is a plan produced by the Environment Agency to aid the understanding of the scale and extent of flooding now and in the future and sets policies for managing flood risk within the catchment. The CFMP's aim is to promote more sustainable approaches to managing flood risk.

The CFMP summarises the need to manage future flood risk with four main messages:

- Flood defences cannot be built to protect everything.
- Climate change will be the major cause of increased flood risk in the future.
- The floodplain is our most important asset in managing flood risk.
- Development and urban regeneration provide a crucial opportunity to manage the risk.

² Environment Agency, Flood Zone and Flood Risk Tables, <https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables>

³ Environment Agency, Flood Risk Vulnerability and Flood Zone Compatibility, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone_compatibility.pdf

⁴ Aylesbury Vale District Council, Strategic Flood Risk Assessment, <https://www.aylesburyvaledc.gov.uk/sites/default/files/SupportingEve/Level2/2016s3990%20-%20Aylesbury%20SFRA%20Level%20%20-%20Final%20v3%20%28Aug%202017%29.pdf>

⁵ Environment Agency, Thames Catchment Flood Management Plan, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/293903/Thames_Catchment_Flood_Management_Plan.pdf

The Site is located within “Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits”.

There are approximately 11,300 properties with a 1% risk of flooding from rivers. This figure is estimated to increase by between 10% and 30% by 2100 as a result of the impacts of climate change.

The key message from the CFMP for this sub-area is:

- We will work with Local Planning Authorities to retain the remaining floodplain for uses that are compatible with flood risk management and put in place policies that lead to long-term adaptation of urban environments in flood risk areas.



2. Current Site Flood Risk

This section of the FRA has been prepared to identify potential sources of flooding to the Site and the likely mechanisms by which flooding could occur.

The Langford Brook flows south west of the Site, approximately 85m from the northern boundary of the Compound.

Potential sources of flooding and associated mechanisms for review are as follows:

- River (Fluvial and Tidal) Sources - flooding resulting from watercourses near to the site or from the sea;
- Tidal Sources - flooding resulting from tidal sources;
- Groundwater Flooding- flooding as a result of rising groundwater levels;
- Overland/Surface water (Pluvial) Flooding - flooding as a result of surface water flows from adjacent land; and
- Infrastructure - flooding as a result of canals, sewers and reservoirs.

In the following sections of the report, these scenarios have been discussed and the flood risks to the development examined in more detail.

History of Flooding

The SFRA outlines numerous historical flood events in the Aylesbury Vale District. The SFRA does not identify any instances of historical flood events on the Site. It does, however, identify two areas with recorded historic flood events within a kilometre of the site. One is approximately 1km to the south-east, whilst the other is located approximately 620m to the north-east of the Site; with both being recorded to have originated within the Launton and Langford catchments respectively. These events are remote from the Site, however it reinforces the need to ensure no increase in surface water from the site by use of an appropriate Drainage Strategy.

Fluvial Flood Risk

The mapping showing the risk of flooding from fluvial sources has been prepared by the Environment Agency⁶, of which an extract from the mapping is included as Figure 1-2 above.

The Site is located within Flood Zone 1, which indicates that the site is not at flood risk from fluvial sources. The area immediately north of Compound A1 falls within the Environment Agency Flood Zone 2 and 3.

There is an existing detailed Environment Agency hydrological and hydraulic model for the Langford Brook. The existing model and hydrology have been used to model climate change and the modelling results have been used to amend the Site layout where possible to avoid the floodplain areas. The model results will be used to inform the Flood Management Plan. The Langford Brook sits within the Thames river basin, and as part of wider EWR scheme modelling the 70% increase in flows climate change factor (representing the 'Upper End' estimate anticipated for the '2080s' (2070 to 2115)) has been assessed. It should be noted that as a 'less vulnerable' development with a design life of 5-years the climate change factor which should be applied is the 'Higher Central' allowance, i.e. a 15% increase in flows.

The figure below demonstrates that even applying the Upper End climate change factor of 70% the Compound is outside of the 1% annual chance event (including 70% climate change allowance). Figure 2-2 provides a zoomed in view of this flood extent on the northern boundary of the Compound.

⁶ Environment Agency, Flood Risk from Rivers, <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

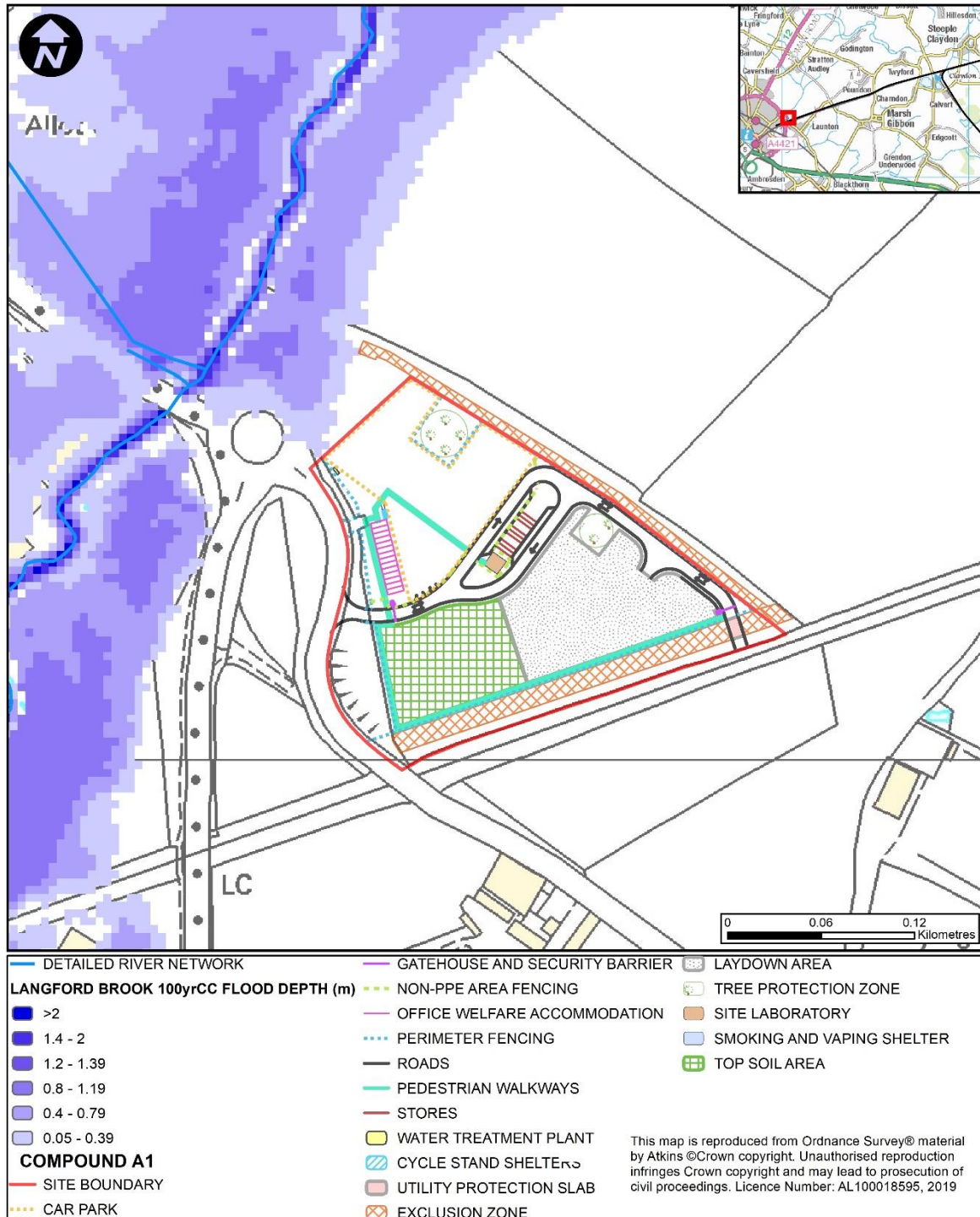


Figure 2-1 Modelled 1% annual chance event (including 70% climate change allowance) flood extents

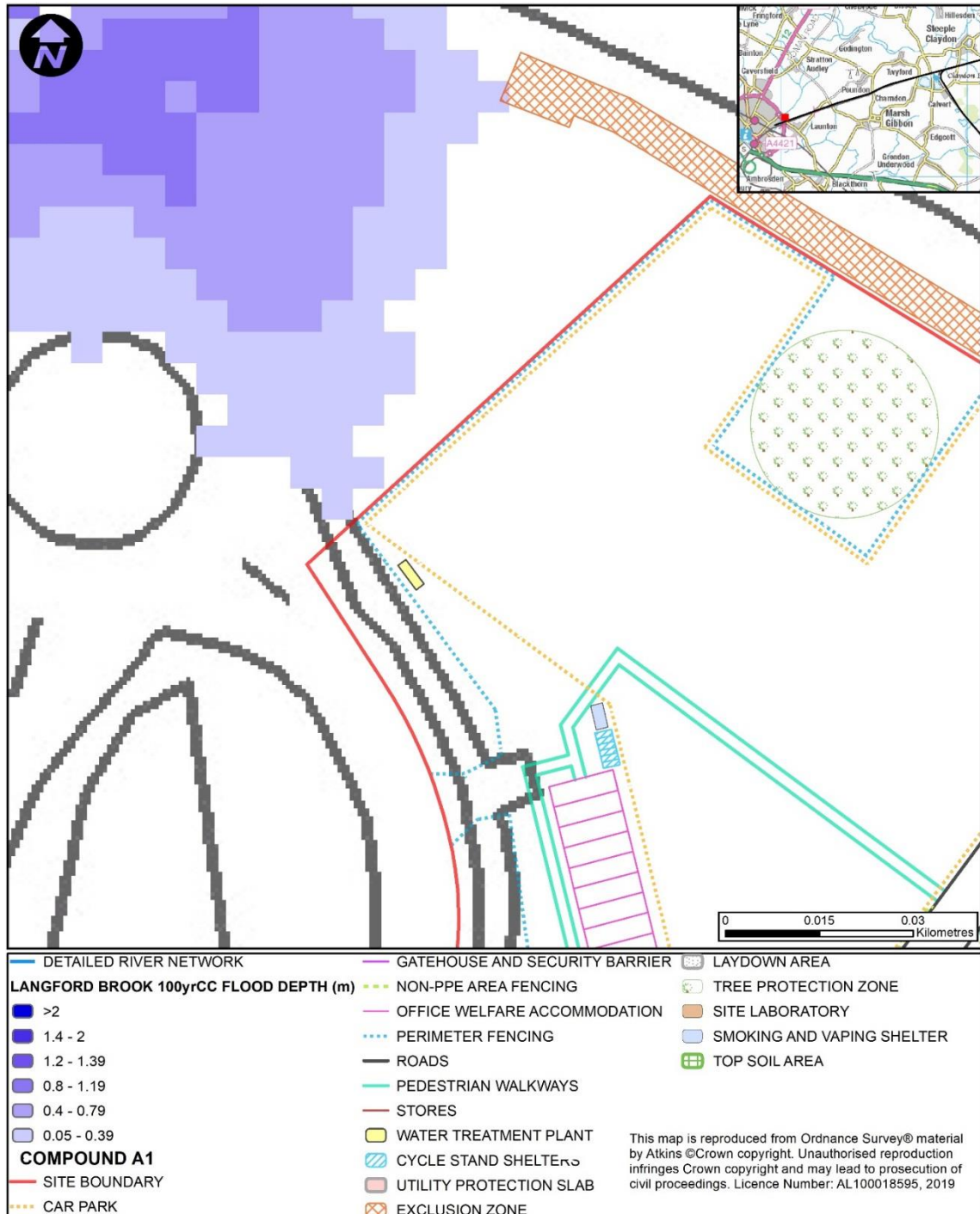


Figure 2-2 Modelled 1% annual chance event (including 70% climate change allowance) flood extents – north west Compound boundary

The Compound layout has been designed to avoid the fluvial flood risk predicted by the hydraulic modelling results. Flood Zone 3 is approximately 20m from the Compound Boundary. Maximum flood depths adjacent the Compound boundary at the 1% annual chance event (including 70% climate change allowance) are <150mm; it should be noted this is based on detailed modelling outputs, the flood extents and depths are therefore considered to be robust. The site has been arranged sequentially with flood risk in mind, as can be seen in Figure 2-2, with the area of the Compound

nearest the modelled floodplain proposed to be used for car parking. Therefore, there is no ground raising proposed near the modelled floodplain outlines. The hydraulic model results have demonstrated that the proposed Compound area is outside of the floodplain and therefore a Compensatory Flood Storage Area (CFSA) is not required for the temporary Compound.

Access and egress is possible in the 1% annual chance event (including climate change).

There are no works proposed in the floodplain, and safe access and egress is possible from the site; the proposed development will not increase flood risk elsewhere.

Tidal Flood Risk

The Site is located inland and does not lie within an area at risk of tidal flooding. Tidal flooding is therefore not a flood risk associated with this proposed development and requires no further consideration.

Groundwater Flood Risk

The SFRA reports that there are no historical records of groundwater flooding in the region.

The Site is located in an area identified by national scale modelling as having no groundwater flood risk. The geology and groundwater issues can be summarised as follows:

- Groundwater Flood Risk: located in an area identified by national scale modelling as having no groundwater flood risk.
- Superficial Aquifer: There are no superficial deposits mapped at this location.
- Bedrock Aquifer: Secondary A Aquifer (Kellaways Sand Member).
- Source Protection Zone: none present within 500 m.
- Abstractions: no abstractions or British Geological Survey (BGS) groundwater wells located within 500 m of Compound A1.

Overland/Surface Water (Pluvial) Flooding

Pluvial and overland flow results from rainfall that fails to infiltrate and travels over the ground surface. This is exacerbated by low permeable urban development or low permeability soils and geology (such as clayey soils). Overland flow is likely to occur at the base of an escarpment and low points in terrain. Local topography and built form can have a strong influence on the direction and depth of flow. The design of development down to a micro-level can influence or exacerbate this. Overland flow paths should be taken into account in spatial planning for urban developments. In addition, surface water flooding can be exacerbated if developments increase the percentage of impervious area generating more runoff.

The RoFSW maps indicate that a small area in the south-eastern corner of the Compound site is at risk from the 3.3% annual chance event upwards. Within the Compound site there is a narrow band of flooding shown running parallel to Bicester Road at the 0.1% annual chance event.



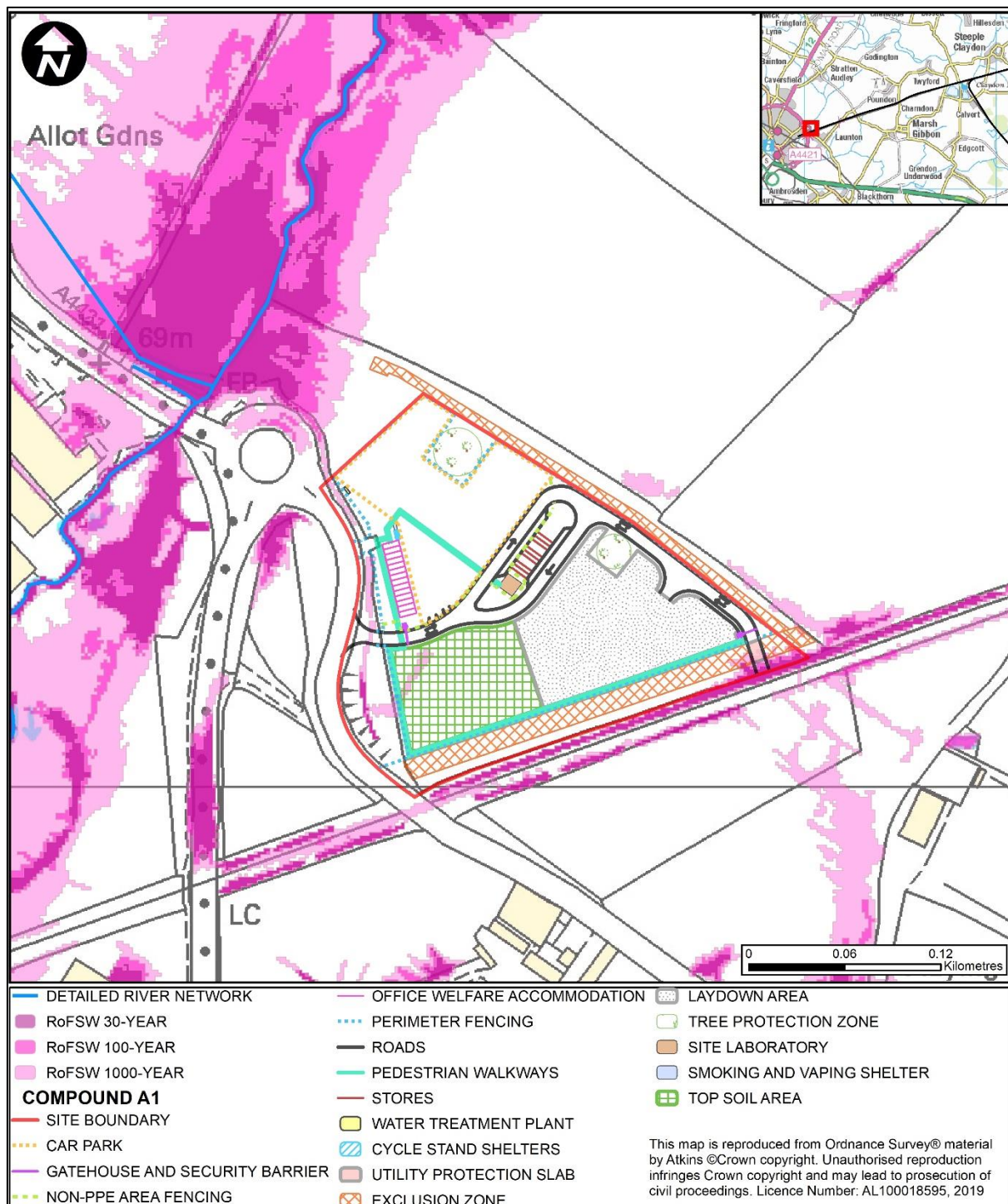


Figure 2-3 RoFSW Flood Maps

Infrastructure Flooding

Canals

The Oxford Canal is 12km west of the Site. The Grand Union Canal at Aylesbury is over 20km south-east of the Site. There are no canals or artificial waterways present within 1km of the Site boundary.

Given the significant distance of the Grand Union Canal and Buckingham Canal from the Site, the overall flood risk from canals and waterways on the Site is considered very low and as such no further consideration of this type of flooding is required.

Reservoirs

Reservoir failure flood risk mapping has been prepared by the Environment Agency⁷. The mapping shows that the Site is not at risk of reservoir flooding. The nearest existing reservoir (Foxcote Reservoir) is approximately 17km north east of the Site. Approximately 23km south west of the Site is Farmoor Reservoir. The risk and extent of flooding from these reservoirs is sufficiently far from the Site such that it is not likely to extend to the Site or its surroundings and therefore no further assessment is required.

Sewers

Flooding can occur when the sewerage infrastructure becomes overwhelmed by heavy rainfall (due to inadequate capacity) or blockages in drain systems (such as silt or debris accumulation). Works above or adjacent to existing sewer networks may also damage buried pipelines to the extent that it leads to flooding through damage during excavations or through damage which cause blockages below ground.

Information on historical flooding from the SFRA suggests that there have been a number of historical sewer flooding incidents within Aylesbury Vale District where the existing drainage infrastructure capacity has been exceeded. There is a Thames Water asset present on the western border of the Compound site, this will not be impacted by the Compound, and is not considered to pose any flood risk to the Site. Existing available information suggests that there is no sewer network present at the site and therefore no further assessment is required. The site is a field and there is unlikely to be existing drainage infrastructure present to pose a risk to the Site.



3.

3. Drainage Strategy

The construction of the temporary compound will result in an increase in runoff compared to the baseline entering local drains and the Langford Brook, potentially increasing flood risk in the immediate vicinity and causing an adverse impact on drainage receptors.

A separate Drainage Strategy for the Compound will be developed, which will seek to ensure that any adverse impacts will be avoided or minimised, as far as practicably possible. Any adverse impacts will be temporary, as construction compounds and temporary works sites will be removed on completion of the works and ground levels restored to pre-development conditions after approximately 6 years.

The Drainage Strategy will include the following details:

- Changes in impermeable area.
- Runoff rates for the existing site and post development.
- Calculations for the attenuation requirement to show how the increase in surface water runoff will be mitigated on site prior to discharging to a suitable method of surface water disposal.
- A drainage layout.
- Maintenance of the drainage network, this should include maintenance activities, their frequency and who will be responsible for these tasks.
- Supporting ground investigations where necessary.

The Drainage Strategy, as stated in the Environmental Appraisal Report will be produced during detailed design and will form part of the CoCP. It is envisaged that surface water runoff and foul effluent will be disposed of as follows:

- Cut of ditches will be provided through the site to intercept surface water runoff from within the temporary compound. Surface water will be attenuated to existing greenfield rates before being discharged to the Langford Brook, which is a Main River located to the north of the compound.
- The method for foul water disposal is currently unconfirmed, however it is likely that foul effluent will be drained to an on-site cess pit that will be periodically emptied for disposal off-site (as stated in Section 1.6.8 of the Environmental Appraisal Report). Confirmation of the method of foul water disposal, and sizing calculations will be undertaken during detailed design of the compound.



4. Conclusions and Recommendations

This FRA is compliant with the requirements set out in the NPPF and the associated Planning Practice Guidance. It has been produced on behalf of Network Rail in support of a planning application for the proposed temporary Compound A1 Charbridge Lane.

The Site is not at risk from sewer, reservoir or canal flooding. The Site is shown to be outside historical flood extents as shown in the SFRA. The entirety of the Site is located within Flood Zone 1 on the Flood Map for Planning from the Environment Agency. The Site is indicated to have a low risk from groundwater flooding, and a small area of the Site is identified to be at risk of pluvial flooding.

In conclusion:

- The proposed Compound has been designed to avoid the fluvial flood risk predicted by the hydrological and hydraulic modelling results. The model results have demonstrated that the entire proposed Compound area is outside of the floodplain (1% annual chance event including 70% climate change), therefore a CFSA, as mitigation, will not be required.
- Flood risk will not pose a risk to the operational activities. Access and egress is possible in the 1% annual chance event (including climate change).
- The proposed development lies within Flood Zone 1 and is therefore appropriate in accordance with the NPPF.
- The flood outlines have been used to inform the Compound boundary and layout. A Drainage Strategy and Flood Management Plan will be developed to manage the surface water runoff on Site.
- Any impacts will be temporary, as the construction compound will be removed on completion of the works and ground levels restored to pre-development conditions.



**EWB Alliance
One Victoria Square
Paradise Street
Birmingham
B1 1BD**

