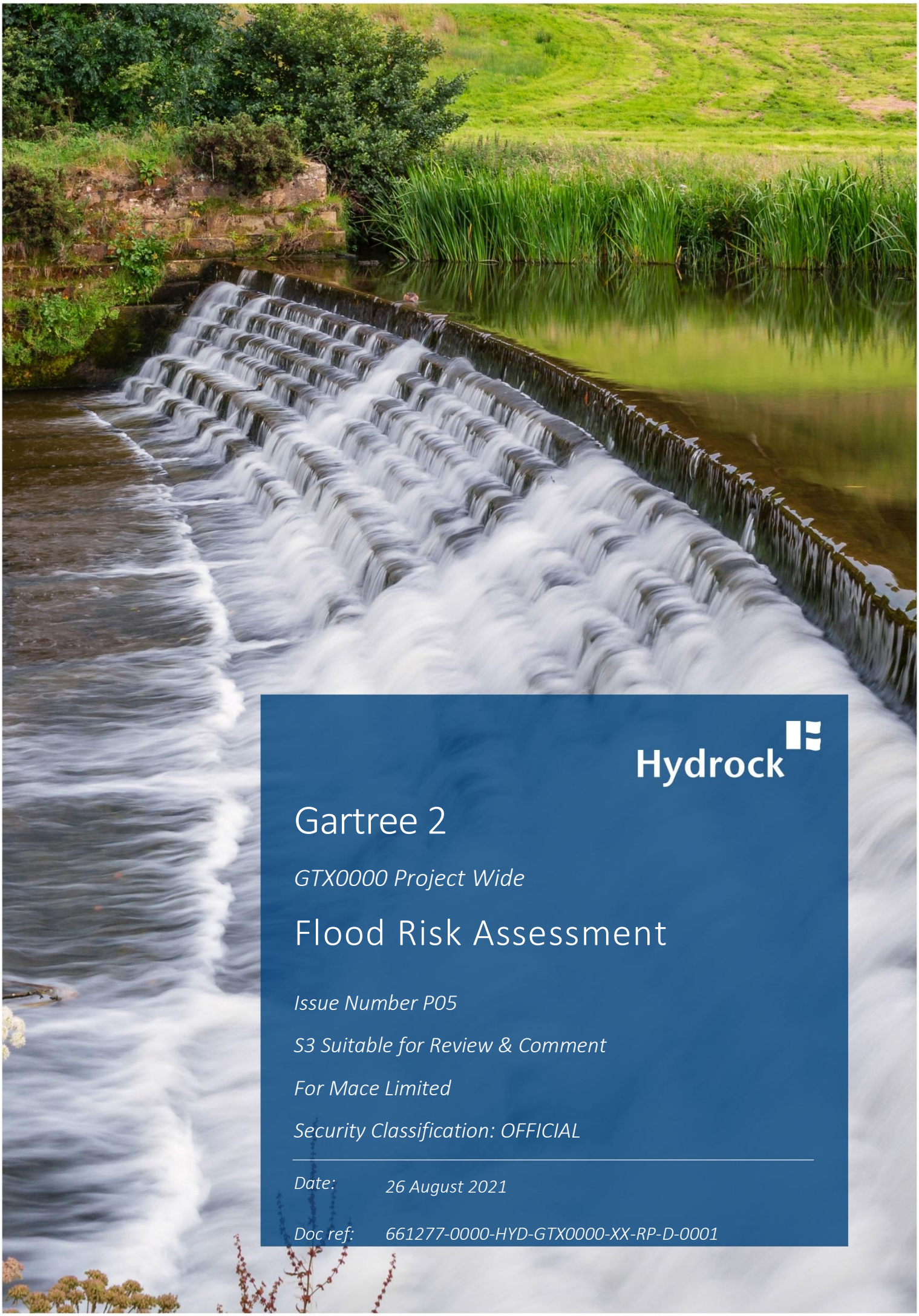

Hydrock

Gartree 2

GTX0000 Project Wide

Flood Risk Assessment

Issue Number P05

S3 Suitable for Review & Comment

For Mace Limited

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CONTENTS

Figures

1. INTRODUCTION

This report has been prepared by Hydrock Consultants Limited on behalf of Mace Limited in support of a Planning Application to be submitted to Harborough District Council for a proposed new prison on land adjacent to Her Majesty's Prison (HMP) Gartree, close to Market Harborough in Leicestershire.

This Flood Risk Assessment report has been prepared to address the requirements of the National Planning Policy Framework (NPPF), through:

- Assessing whether the site is likely to be affected by flooding.
- Assessing whether the proposed development is appropriate in the suggested location.
- Presenting any flood risk mitigation measures necessary to ensure that the proposed development and occupants will be safe, whilst ensuring flood risk is not increased elsewhere.

The report considers the requirements for undertaking a Flood Risk Assessment as detailed in the NPPF.

2. SITE INFORMATION

2.1 Location and Setting

The site lies approximately 3.2km to the north-west of Market Harborough, with postcode LE16 7RP and grid reference SP 70487 88740 (at the approximate centre of the site).

The site area extends to approximately 19.0ha, and currently comprises undeveloped agricultural land.

The site is bounded by HMP Gartree to the north; agricultural land to the east and south; and, Welland Avenue to the west, beyond which lies a residential area and a training centre.

The approximate location of the site is shown in Figure 1.

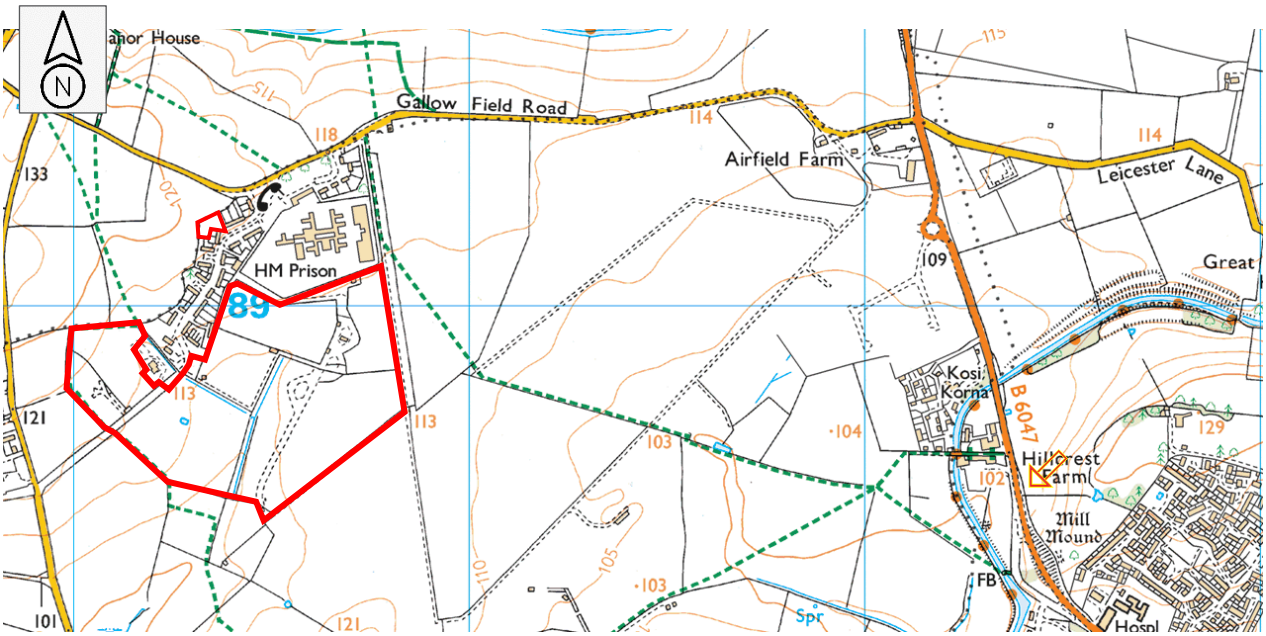

Figure 1: Site Location Plan

2.2 Topography

On a broad scale, Ordnance Survey mapping shows the site to be located on the southern slope of a ridgeline, such that ground levels generally fall in a southerly direction within the vicinity of the site.

A Topographical Survey of the site, included in the Planning Application submission, shows ground levels to fall from the north-eastern and north-western corners of the site, at around 114.7m AOD and 115.4m AOD respectively, towards a shallow valley running through the approximate centre of the site from the northern to southern site boundary (with a low point of around 102.7m AOD on the southern site boundary).

2.3 Proposed Development

Outline Planning Application with all matters reserved except for access and scale for the construction of a new Category B prison of up to 82,555sqm GEA within a secure perimeter fence together with access parking, landscaping and associated engineering works on land adjacent to HMP Gartree, Gallow Field Rd, Market Harborough, Leicestershire LE16 7RP

The indicative site layout proposes a range of buildings and facilities typical of a Category B resettlement prison, including:

- • Seven new houseblocks each accommodating up to 245 prisoners (1,715 prisoners in total), totalling c.53,122 sqm GEA
- • Supporting development including kitchen, workshops, kennels, Entrance Resource Hub, Central Services Hub and support buildings, totalling c. 29,433 sqm GEA
- • Ancillary development including car parking (c. 523 spaces), internal road layout and perimeter fencing totalling 1463 linear meters enclosing a secure perimeter area of 11.69 ha (figures to be confirmed following changes to the red line boundary).

The house blocks will be four storeys in height, whilst the other buildings will range from one to three storeys.

Other development proposed includes kennels, polytunnels, car parking (c. 523 spaces), internal road layout and perimeter fencing. A bicycle shelter is also proposed.

The proposed developed has an anticipated lifespan of 60 years, which allowing for construction etc, equates to a development design life of up to 2085.

Proposed scheme drawings are included with the Planning Application submission.

3. ASSESSMENT OF FLOOD RISK

3.1 Fluvial Flooding

The EA's Flood Map for Planning (Figure 2) shows the entirety of the site to be within Flood Zone 1 (land having a less than 1 in 1,000 annual probability of fluvial flooding).

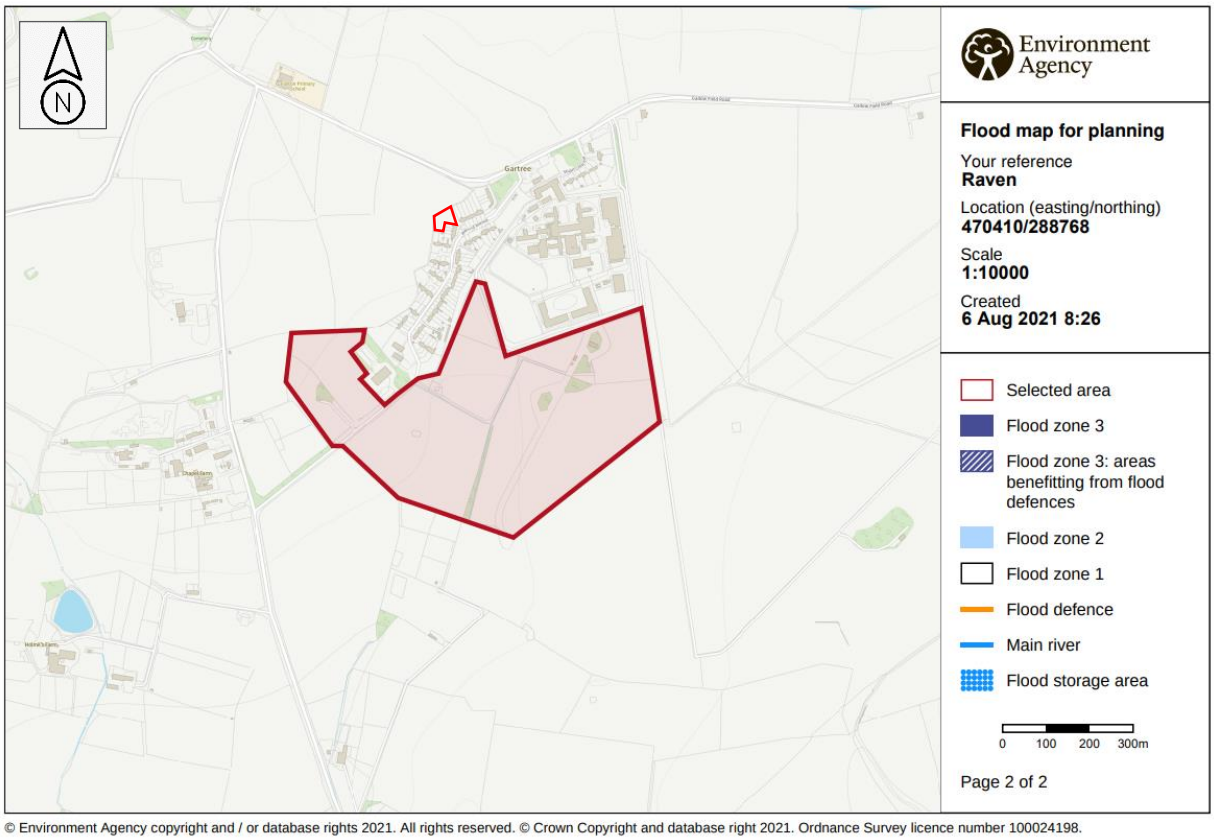

Figure 2: EA Flood Map for Planning

The topographically elevated position of the site means that no watercourses are located within the immediate vicinity, or uphill, of the site, with the nearest watercourses to the site being the Langton Brook, around 1.2km to the north of the site, and the River Welland, approximately 1.4km to the south of the site.

Based on Ordnance Survey mapping, the Langton Brook and River Welland are shown to flow within incised channels adjacent to the site, with the bank levels of the watercourses >15m below the current lowest levels along the southern boundary of the site.

This level difference is considered to afford the site a high degree of protection from any out-of-bank flows from the watercourses, as evidenced by the EA's Flood Zone mapping.

Whilst the potential effects of climate change could increase the frequency, depth and extent of flooding from the Langton Brook and River Welland, given the >15m elevation difference between the bank levels of the watercourses and the existing lowest site levels, any increase in flood risk is considered unlikely to be of a magnitude so as to result in on-site fluvial flooding.

Based upon the points identified above, the site is concluded to be at low risk of fluvial flooding.

3.2 Tidal Flooding

Given the elevation (minimum site level of around 102.7m AOD) and location (i.e. a significant distance from the nearest tidal water body) of the area, the site is concluded to be at negligible risk of tidal flooding, which is not considered to alter as a result of climate change.

3.3 Surface Water Flooding

An existing ditch network is currently present within the site, as shown in Figure 3. 'Ditch A' issues at the northern site boundary and then flows southwards through the site, and discharges to the River Welland to the south of the site. 'Ditch B' issues at the north-western corner of the site and flows south-eastwards to converge with 'ditch A' near the centre of the site. The ditches generally comprise shallow depressions (<1.0m deep) and only become defined in the southern portion of the site, downstream of the point where the two ditches converge.

The Topographical Survey of the site, indicates that 'ditch A' is primarily fed by a 375mm diameter pipe which is believed to discharge surface water run-off from HMP Gartree to the north of the site (based on the position and orientation of the pipe). Whilst the upstream inflow to 'Ditch B' has not been confirmed as part of the Topographical Survey of the site, Ordnance Survey mapping indicates that any overland flows generated from the undeveloped agricultural land and Welland Avenue (including existing built development located along Welland Avenue) could be directed into 'ditch B'.

The EA's Flood Risk from Surface Water mapping (Figure 3) shows the majority of the site to be at 'very low' risk of surface water flooding, with any surface water overland flows generated uphill (to the north and north-west) of the site indicated to be conveyed within the existing ditch network and through the site.

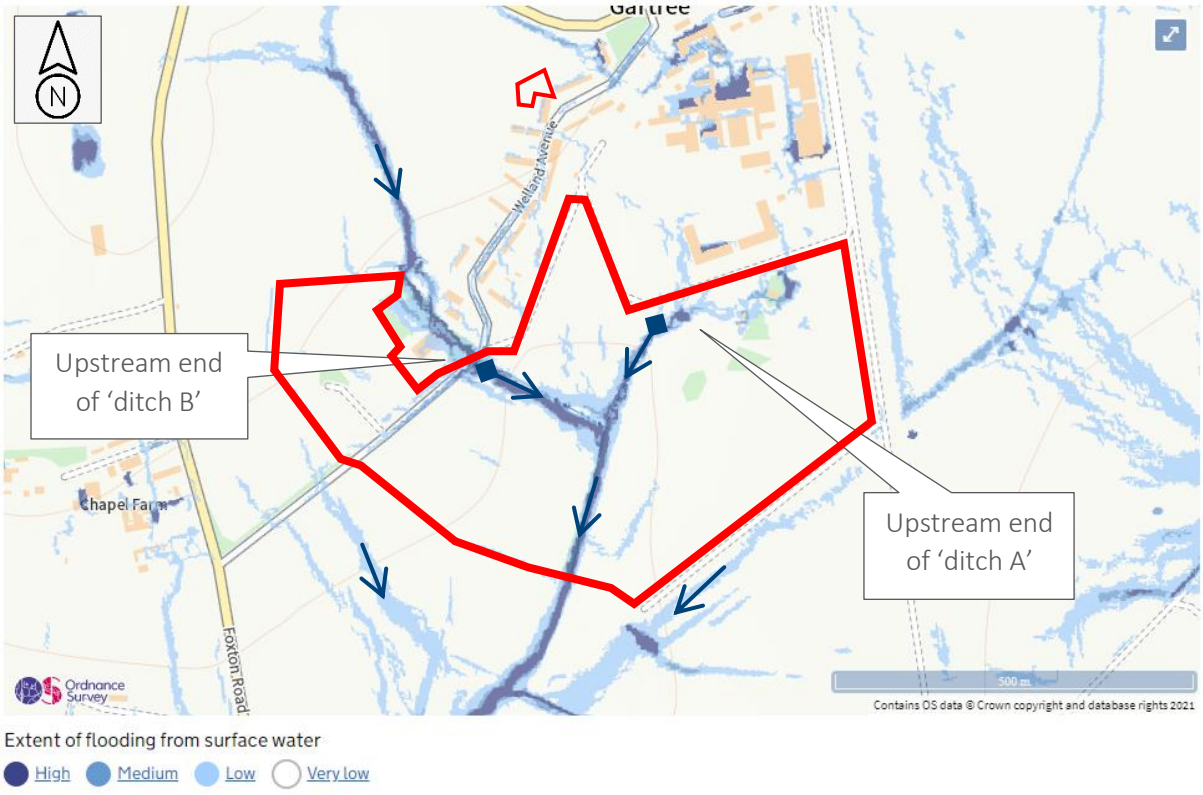

Figure 3: EA Flood Risk from Surface Water Mapping

The EA's mapping does indicate the potential for some out-of-bank flows from the ditches, though this is indicated to be largely retained within land immediately adjacent to the ditches and be <0.3m deep.

Based on the existing site topography, any surface water run-off generated within the site will likely be directed overland as shallow 'sheet-flow' with the prevailing topography, and into the existing ditches, as opposed to 'ponding' within the site.

Whilst the potential effects of climate change could increase the frequency, depth and extent of on-site surface water flooding, given the sloping topography of the site, any increase in flood risk is considered unlikely to be of a magnitude which would result in a significant increase in the risk of on-site surface water flooding, as any surface water run-off will likely continue to be directed overland as shallow 'sheet-flow' with the prevailing topography, and into the existing ditches, as opposed to 'ponding' within the site.

On the basis of the above, the site is concluded to be at low risk of surface water flooding, on the assumption that the function of the existing ditch network is retained as part of the proposed development (which is addressed within section 4.2.4.2).

3.4 Groundwater Flooding

British Geological Survey mapping shows the site and surrounding area to be underlain by the Dyrham Formation comprising Siltstone and Mudstone.

The generally low permeability of such geology is unlikely to be conducive to groundwater emergence. Furthermore, the topographically elevated position of the site means that any sub-surface groundwater flows are likely to be directed downhill and away from the site, preferentially emerging within the surrounding lower-lying land, i.e. the Langton Brook valley and River Welland valley around 1.2km to the north and 1.4km to the south of the site respectively.

Given that the determination of groundwater flood risk in this instance is principally driven by geological and topographical factors, both of which will be unaffected by the potential effects of climate change, the risk of groundwater flooding posed to the site is considered unlikely to increase as a result of climate change.

Accordingly, the site is concluded to be at low risk of groundwater flooding.

3.5 Infrastructure Failure Flooding

Similar to the assessment of potential surface water flooding, in the scenario that any sewers were to surcharge uphill (to the north and north-west) of the site, any overland flows will likely be preferentially directed overland as shallow 'sheet-flow' with the prevailing topography, and into the existing ditches, as opposed to 'ponding' within the site.

The Grand Union Canal is located approximately 0.7km to the north of the site. However, the bank levels of the canal are at a lower level than existing site levels, with lower-lying land also identified on the opposite bank (i.e. to the north of the canal towards Langton Brook). Accordingly, if the canal were to breach / overtop, any overland flows will likely to preferentially directed northwards and away from the site. No other potential sources of infrastructure failure flooding, such as reservoirs, were identified within the immediate vicinity, or uphill, of the site.

Given that the determination of infrastructure failure flood risk in this instance is principally driven by topographical factors, which will be unaffected by the potential effects of climate change, the risk of infrastructure failure flooding posed to the site is considered unlikely to increase as a result of climate change.

On this basis, the site is concluded to be at low risk of infrastructure failure flooding.

4. NPPF REQUIREMENTS

4.1 Sequential & Exception Tests

This assessment has demonstrated that the site is on land designated as Flood Zone 1 by the EA's Flood Zone Mapping, and is at low risk of flooding from all other potential sources.

Paragraph 033 of the Flood Risk and Coastal Change National Planning Practice Guidance (NPPG) states that "Nor should it normally be necessary to apply the Sequential Test to development proposals in Flood Zone 1".

The NPPG Flood Risk Vulnerability and Flood Zone Compatibility matrix (Table 3 of the NPPG) also indicates that all forms of development are "appropriate" in Flood Zone 1 without application of the Exception Test.

Accordingly, the application of the Sequential and Exception Tests are concluded to not be required in this instance.

4.2 Mitigation Measures

Whilst an Exception Test is not explicitly required under the NPPG, the following section details measures necessary to mitigate any 'residual' flood risks, to ensure that the proposed development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, akin to the requirements of section 'b' of the Exception Test, as outlined in the NPPF.

4.2.1 Resistance and Resilience Measures

Given the low risk of flooding identified at the site (and assuming that the function of the existing ditch network is retained as part of the proposed development (which is addressed within section 4.2.4.2)), no specific flood resistance or resilience measures are considered necessary.

4.2.2 Safe Access and Egress

Access to the site will be via the existing surrounding highway network, which is indicated to be at low risk of flooding, based on the EA's Flood Map for Planning and Flood Risk from Surface Water mapping (the potential surface water flooding indicated along Welland Avenue (the main access road serving the site), and along portions of the existing surrounding highway network is generally shown to be <0.3m deep, and therefore considered unlikely to impede safe vehicular access).

As such, safe access and egress is concluded to be possible to and from the site.

4.2.3 Floodplain Storage

On the basis that the site has been demonstrated to be at low risk of flooding, and therefore outside a functioning floodplain, the proposed development is not considered to increase flood risk within the catchment through a loss of floodplain storage, and accordingly no further mitigation measures are required in this respect.

4.2.4 Surface Water Drainage

4.2.4.1 Existing

Based on the undeveloped nature of the site, it is not anticipated that the site is currently served by an extensive drainage network.

Therefore, rainfall within the site is assumed to currently preferentially infiltrate to ground, with any rainfall unable to infiltrate (i.e. in the scenario that the infiltration capacity of the site is exceeded as a result of prolonged and/or intense rainfall), likely to be directed overland as shallow 'sheet-flow' with the prevailing topography, and into the existing ditches.

4.2.4.2 Proposed

Given the potential for the proposed development of the site to generate surface water run-off which could be directed off-site onto third-party land, a proposed Drainage Strategy has been prepared for the site. The Strategy has been prepared separately and included with the Planning Application submission, and accordingly should be consulted regarding the proposed means of surface water drainage. However, the following principles are to be adopted within the design and specification of the proposed system:

- In accordance with Building Regulations Part H and Paragraph 080 of the NPPG, rainfall run-off should (in preferential order) be: re-used, infiltrated to ground, discharged to a local watercourse, discharged to a surface water sewer, or discharged to a combined water sewer. In respect of each potential means of surface water disposal:
  - The re-use of clean surface water run-off (i.e. from proposed building roof areas) will be considered and adopted where feasible.
  - Infiltration drainage is not anticipated to be practicable based on the indicative low-permeability of the on-site geology. However, this will be subject to confirmatory infiltration testing, and whilst not anticipated, on-site infiltration drainage will be used if demonstrated to be viable.
  - Existing watercourses (ditches) are indicated to be present within the site and therefore may offer a potential means of surface water disposal. This would be subject to confirmation of capacity and downstream connectivity.
  - The presence of an existing sewer system within the vicinity of the site is yet to be confirmed, though if proven, may offer an alternative means of surface water disposal if discharging to existing adjacent ditches is identified to be unviable.
- The acceptability of discharging surface water run-off from the site to watercourses and/or sewer will be subject to agreement with Leicestershire County Council (in their role as Lead Local Flood Authority (LLFA)) and Anglian Water, respectively. However, it is anticipated that any discharge will need to be restricted to the pre-development run-off rate from the site (and potentially reduced compared to existing rates), for all storm events up to and including the 1 in 100 year + 40% (climate change allowance) storm event.
- On-site attenuation storage will likely be required to ensure no on-site flooding in up to and including the 1 in 100 year + 40% storm event. Such attenuation should ideally adopt Sustainable Drainage System (SUDS) principles.
- It is likely that appropriate and proportionate pollution control methods will also need to be incorporated into the proposed system to ensure an acceptable surface water discharge quality from the site.

The function of the existing ditch network (i.e. 'ditch A' and 'ditch B', as shown in Figure 3) will need to be retained as part of the proposed development, in order to ensure any existing in-flows to the ditches can still be managed, to reduce the risk of surface water flooding at the site, and to offer a viable

potential surface water disposal option for the discharge of surface water run-off from the proposed development.

In order to facilitate the proposed development of the site whilst also acknowledging security considerations, it is anticipated that the ditches will need to be diverted along the north-western / western / south-western site boundary, in a combination of open channel and culvert (in order to facilitate access crossings etc, where necessary), before reverting to its original course at the southern site boundary.

The proposed route and dimensions of the realigned ditch will be confirmed at the detailed design stage, and it will need to be ensured that the proposed ditch offers suitable conveyance capacity for the anticipated in-flows from upstream. In addition, a minimum 5.0m easement will need to be provided from the edge of the realigned ditch/culvert to any new above ground structures, including buildings and fences/walls.

The proposed ditch diversion works will also be subject to Ordinary Watercourse Consent via the LLFA.

5. CONCLUSIONS

A detailed assessment of flood risk has identified that the site is within Flood Zone 1, and is at low risk of flooding from all sources assessed.

In accordance with the NPPF and NPPG, the application of the Sequential and Exception Tests are concluded to not be required in this instance.

Given the low risk of flooding identified at the site, no specific flood resistance or resilience measures are considered necessary.

It has also been demonstrated that a means of safe access and egress is possible to and from the site; and, that the proposed development is not considered to increase flood risk within the catchment through a loss of floodplain storage.

A proposed Drainage Strategy has been prepared separately for the site and is included with the Planning Application submission, and this should be consulted regarding the proposed means of surface water drainage. However, it is anticipated that the proposed system will likely entail a restricted discharge to either existing ditches within the site and/or sewer based on the pre-development run-off rate from the site, with on-site attenuation provided for up to and including the 1 in 100 year + 40% storm event.

The function of the existing ditch network within the site will need to be retained as part of the proposed development, and accordingly it is anticipated that the existing ditch system will need to be diverted around the site boundary, in a combination of open channel and culvert, before reverting to its original course at the southern site boundary.

The proposed route and dimensions of the ditch will be confirmed at the detailed design stage, and it will need to be ensured that the ditch offers suitable conveyance capacity for the anticipated upstream in-flows.

The proposed ditch diversion works will be subject to Ordinary Watercourse Consent via the LLFA.

This report therefore demonstrates that, in respect of flood risk, the proposed development of the site with a new prison:

- Is suitable in the location proposed.
- Will be adequately flood resistant and resilient.
- Will not place additional persons at risk of flooding, and will offer a safe means of access and egress.
- Will not increase flood risk elsewhere as a result of the proposed development through the loss of floodplain storage or impedance of flood flows.
- Will put in place measures to ensure surface water is appropriately managed.

As such, the Planning Application submitted for the site is concluded to meet the flood risk requirements of the NPPF.

Hydrock Consultants Limited