Client:	R G Carter
Site:	Benwick Community Primary School, High Street, Benwick, March, Cambridgeshire, PE15 0XA
Report ref.:	3352_01
Prepared by:	Paul Godbold BSc MSc FGS
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Version	*FINAL*

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Appendices

Cover Photograph: Sourced from Benwick Primary School Facebook page.

[1] EA = Environment Agency
[2] SFRA = Strategic Flood Risk Assessment

1 Introduction

BOLD Environmental has been commissioned by R G Carter to undertake a Flood Risk Assessment (FRA) to accompany a development proposal for the expansion and remodelling of **'Benwick Community Primary School, High Street, Benwick, March, Cambridgeshire, PE15 0XA',** (hereafter referred to as 'the site'). Further detail regarding the proposed development is provided in Section 2.

1.1 Site-Specific Flood Risk Assessment (FRA)

In accordance with the National Planning Policy Framework (NPPF) and Environment Agency Guidance, a Site Specific Flood Risk Assessment (FRA) should be both proportionate to the degree of flood risk and appropriate to the scale, nature, and location of the proposed development or land use.

As the proposed development would retain the existing educational end use, the Flood Risk Vulnerability Classification for the development has been determined as 'More Vulnerable' (as defined by the NPPF).

The Environment Agency flood risk setting for the site is determined as being within Flood Zone 3 (and benefitting from flood defences).

Flood Zone 3 may be categorised further as Flood Zone 3a (defined as a high probability of flooding), and Flood Zone 3b (defined as the functional Floodplain). New development should not be permitted within Flood Zone 3b. Flood Zone Mapping presented within the Fenland Level 1 Strategic Flood Risk Assessment (SFRA, 2022) indicates that the site is within Flood Zone 3a. (Flood Zone delineation is discussed in Section 3).

In recognition that the site is located within Flood Zone 3, a **Level 2 Flood Risk Assessment (FRA): Scoping Study** has been conducted.

The FRA presented within this report therefore follows the government guidance for 'Flood Risk Assessment in Flood Zones 2 and 3'.

The aim of the FRA is to provide an appraisal of the potential flood risk posed to the site, and equally the potential impact that the proposed development may have on flood risk to land or property external to the site. The Scoping Study will identify whether or not there are flooding or surface water management issues that require additional consideration, and consequently completion of a more detailed Flood Risk Assessment.

In completing the FRA, the following data sources were referenced:

- Fenland Level 1 Strategic Flood Risk Assessment (SFRA) (June 2022).
- Fenland Outline Water Cycle Study (June 2022).
- Fenland District Council Level 1 Strategic Flood Risk Assessment (SFRA) (July 2011).
- Cambridgeshire Flood Risk Management Strategy 2021 - 2027.
- Cambridgeshire County Surface Water Management Plan Countywide Update 2014, Final Report.

- An Environment Agency Product 4: Detailed FRA / FCA Map and 'Fenland Flood Zone Improvements (Product 5) (ref: EAN/2022/276922 220819/AA11) (2022).

The Level 2 FRA: Scoping Study did not include a specific flood risk Site Reconnaissance.

1.2 Site Setting

The subject site is located adjacent west of the High Street, close to the southern boundary of Benwick Village, within the Fenland District of Cambridgeshire; approximately 15 miles south of Peterborough. The irregular shaped plot covers an area of approximately 0.689ha; and is centred at National Grid Reference TL 34287 90113.

The main school buildings are located within the southern and eastern site sections; with a 2 classroom temporary building located within the western site section. A hard surfaced playground is located within the site centre with the Flutterbies Nursery located within the south-western site section. A grassed playing field extends north-west from the north-west corner of the site. Vehicular access to the school is along the eastern perimeter from High Street.

The site is located within a residential area, with residential properties bordering on three sides and Benwick Village Hall and Church to the north. (Site Plans indicate the Village Hall to be within the curtilage of the Benwick School site).

A Site Location Map is provided within Appendix A.

1.3 Site Topography

A site specific Topographic Survey of the site was unavailable at the time of preparing this report.

Published Ordnance Survey data suggests the site is flat, with an approximate elevation of 0.00mAOD.

1.4 Existing Site Drainage

A site specific Utility Survey was unavailable at the time of preparing this Flood Risk Assessment (FRA). Existing Foul and Surface Water Drainage is therefore unconfirmed.

It is however known that an Anglian Water Sewer passes beneath the curtilage of the site[3].

1.5 Surface Water Bodies / Features

There are no surface water features or watercourses within the curtilage of the site.

Several Surface Water Drains are located in close proximity to the site, to the east, south and west of the village. The closest drain being along the eastern side of the High Street <10m from the eastern site perimeter.

The closest Main River is the River Nene (Old Course) located approximately 445m north of the site.

Surface Water Features are illustrated on the Site Location map within Appendix A.

[3] Based on detail contained with the 'Milestone One Report' for Benwick School (Pick Everard, Issue 1.0 20th August 2022).

1.6 Geology and Ground Permeability

Published British Geological Survey (BGS) records indicate that the bedrock beneath the site is the Oxford Clay Formation (comprising mudstone).

BGS records indicate that bedrock is overlain by Superficial Tidal Flat Deposits – 1 (comprising sand and silt).

There are no published BGS public borehole records within 1km of the subject site.

A Site Investigation was undertaken on 2nd September 2022[4], comprising five (5No.) Window Sample Boreholes all advanced to a depth of 4.45m below ground level (mbgl). The boreholes all confirmed between 0.25m and 1.00m of Made Ground over interbedded silt clay and peat (with slight variation across the site). The sequence was compatible with published Tidal Flat Deposits. Groundwater strikes were not recorded in any of the boreholes.

The Oxford Clay Formation is classified by the Environment Agency as an Unproductive Aquifer; with the overlying Tidal Flat Deposits-1 classified as a Secondary Undifferentiated Aquifer.

Based on the observations within the recent Site Investigation (and the published geological sequence), the ground permeability is considered variable to low.

The site is *not* located within an Environment Agency Source Protection Zone.

[4] Site Works completed by Geosphere Environmental Limited on behalf of R G Carter.

2 Development Proposal

At the time of preparing this this Flood Risk Assessment (FRA), the proposed Development Plan was to expand the existing school facilities to accommodate 120 pupil places; in conjunction with the removal of existing mobile classrooms.

Two options were under consideration for extending the school at its current site; the principal elements were as follows:

Option 01

- Remove the exiting Mobile Classroom Building;
- **Expansion to four (4No.) Permanent Classrooms (constructing two [2No.] new classrooms to replace the existing mobile classrooms);**
- **Provision of a new 180m^2 Hall;**
- Internal Improvements (*mostly concerning staff and pupil welfare facilities*);
- Retention of the existing Dining / Kitchen Facilities.

Option 02

- A**s per Option 01; except:**
- **Provision of a New Kitchen (with dry goods store, staff facilities, and servery / chair store);** and
- Provision of a Hall and External PE Store.

The Existing Ground Floor Plan of the school, and the following Development Plan Options are presented within Appendix B:

- Existing General Arrangements (drawing sourced from the One Milestone Report [Pick Everard 20th August 2021, page 9]);
- Option 01: Proposed General Arrangement 01 (drawing sourced from the One Milestone Report [Pick Everard 20th August 2021, page 17]); and
- Option 02: Proposed General Arrangements 02 (drawing sourced from the One Milestone Report [Pick Everard 20th August 2021, page 18]).

The increased footprint of the proposed new construction for each option is as follows:

Option 01: 361m^2

Option 02: 441m^2

2.1 Vulnerability Classification of the development

As the development would retain the existing educational end use, the Flood Risk Vulnerability Classification would remain “More Vulnerable” (as defined by NPPF).

2.2 Proposed Finished Floor Levels

Development Plans do not propose a Finished Floor Level (FFL) for proposed new construction. It is however assumed that continuity of level access would be required with the FFL of the existing buildings.

A FFL recommendation based on the flood risk setting of the site is discussed within Section 4.2 Mitigation Measures.

2.3 Proposed Site Drainage

A proposed Drainage Strategy had yet to be confirmed at the time of preparing this Flood Risk Assessment (FRA).

The One Milestone Report (Pick Everard, 2021) outlines the intention to discharge Surface Water Drainage to one of the surrounding watercourses / ditches. The report also outlines the intention to discharge Foul Drainage to the existing Anglian Water infrastructure.

(*It is noted that the site is located within the jurisdiction of the Benwick Internal Drainage Board [IDB], and as such, approval should be sought from the IDB regarding any proposals to discharge Surface Water Drainage to external drainage infrastructure such as watercourses, ditches, or drains*).

The Fenland District Council Strategic Flood Risk Assessment (SFRA) (2022) includes a map of the borough indicating 'Compatibility with Infiltration SuDS'[5] map. The subject site is located within an area classified as having 'Opportunities for Bespoke Infiltration SuDS'. Reliance on Infiltration SuDS would therefore only be possible by demonstrating the viability of infiltration by conducting on-site Infiltration (Soakaway) Testing in accordance with BRE 365.

A Surface Water Drainage Strategy is recommended.

[5] SuDS -= Sustainable Drainage Systems

3 Flood Zone Classification

Flood Zone classifications are defined within the National Planning Policy Framework (NPPF) as follows; and relate to the potential risk from flooding by river or sea:

Flood Zone 1 - land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

Flood Zone 2 - 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 - 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. Flood Zone 3 is further classified into Flood Zone 3a (high probability) and 3b (the functional floodplain, comprising land where water has to flow or be stored in times of flood).

Environment Agency flood zone mapping indicates that the site is located entirely within Flood Zone 3.

Flood Zone Mapping presented within the Fenland District Council Strategic Flood Risk Assessment (SFRA, 2022) indicates that the site is located within Flood Zone 3a.

EA and SFRA Flood Zone maps are provided within Appendix C.[6]

The Environment Agency / Natural Resources Wales 'Risk of Flooding from Rivers and the Sea (RoFRaS) database' (Risk of Flooding from Rivers and Sea) generates an indication of river and coastal flood risk based on a 50m grid. The database considers the probability that any flood defences (if present) will overtop or breach, and the distance from the river or sea. **The RoFRaS Flood Rating for the site indicates the *maximum* risk to be a 'Medium' risk of flooding across the entire site (less than 1 in 30 [3.3%] but greater than 1 in 100 [1%] in any given year).**

A RoFRaS Flood Rating map is provided within Appendix C. [7]

3.1 Flood Defences

The EA on-line Flood Defence dataset (Flood Defences) indicates no flood defence assets within 250m of the site. The closest Flood Defences are located along the reach of the River Nene and Morton's Leam approximately 10km north-west of the site.[8]

3.2 Historic Flooding

The EA on-line historic flood map dataset (Historic Flood Map) indicates that the subject site has *not* been impacted by historical fluvial flooding.

The Fenland SFRA (2022) presents a Historical Flood Incidents map (based on data from the EA, Cambridgeshire County Council, IDBs[9] and Anglian Water). There are no events

[6] Open Government Licence
[7] Open Government Licence
[8] Open Government Licence
[9] Internal Drainage Boards

indicated in close proximity to the subject site. A Historical Flood Map is presented within Appendix D.

3.3 Fluvial Hydraulic Modelling

BOLD Environmental Limited (agb) submitted a Product 4 data request to the EA for modelled hydraulic data for the reach of the River Nene (Old Course) north of the site.

The Product 4 response from the EA (2022) provided a link to the 'Fenland Flood Zone Improvements' final report (Feb. 2007) (completed by JBA Consulting).

The EA Product 4 response confirmed that the current Flood Map for Planning (Rivers and Sea) for the area (*including Benwick*) is the best available map covering the subject site. The EA confirmed that the Flood Map for Planning been produced from the Fenland Flood Zone Improvements modelling; stating "*This modelling incorporated direct rainfall and an equilibrium, undrained water level, to better represent an undefended scenario for the Fens in the absence of drainage. This modelling represents the Fens in a flood scenario without flood defences and without any of the drainage infrastructure which has created the Fens as they currently are. This is a broadscale model, intended for use in catchment scale studies, and as such further detail may be required for site-specific flood risk assessments*".

In summary, the report modelled both the 1 in 100 (1%) and 1 in 1,000 (0.1%) annual exceedance probability events to redefine the extent of flood zone mapping. The resulting flood outlines were found to be more extensive than the existing Fluvial Flood Zones.

The mapping illustrated within the report confirms that the site and the area surrounding Benwick is defined as being within Flood Zone 3.

The report did not include specific flood elevation detail for the modelled AEP events.

Current published data does not provide potential flood elevations for specific flood event scenarios in the vicinity of the site. Flood elevations relevant to the subject site are therefore not established.

3.4 Surface Water (Pluvial) Flooding

Surface water (pluvial) flooding is rainfall generated overland flow prior to runoff entering a watercourse or sewer. Actual flooding may be a result of either overwhelming of sewerage and drainage systems during extreme events; or less extreme rainfall events over lower permeability ground. In such circumstances, overland flow and ponding may occur in topographic depressions.

The Environment Agency on-line Long Term Flood Risk mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/) provides mapping of Surface Water Flood risk for 'High', 'Medium', and 'Low' risk scenarios. Map extracts of the 'High', 'Medium', and 'Low' risk scenarios are presented in Appendix E.

A 'High' risk represents a chance of Surface Water Flooding of greater than 3.3% (1 in 30). The EA map extract for this scenario shows 'No Risk' across the entire site.

For the 'Medium' risk scenario, of between 1% (1 in 100) and 3.3% (1 in 30), 'No Risk' of flooding is indicated across the entire site. The only exception being a spatially very limited

area of 'Medium Risk' is indicated within the most southerly perimeter of the school playing field; with an associated flood depth of below 300mm.

For the 'Low' risk scenario between 0.1% (1 in 1,000) and 1% (1 in 100), potential surface water flooding is again indicated within the southern section of the school playing field; with a slightly greater spatial extent. The associated maximum flood depth is predominantly below 300mm; with a potential flood depth of 300 – 900mm along the southern perimeter fence of the playing field; covering a very small spatial extent. A further area of 'Low Risk' is indicated within the south-western site section. The potential risk of surface water flooding does not impact the footprint of the existing school buildings; or impact the potential footprint of the proposed new construction to the north-west of the existing building.

The SFRA (2022) includes extracts from Environment Agency (EA) national scale modelling 'Risk of Flooding from Surface Water' (RoFfSW) which maps areas at risk of surface water flooding during the following annual exceedance probability events: 1 in 30 (3.33% AEP) (High Risk); 1 in 100 (1%AEP) (Medium Risk); and 1 in 1,000 year (0.1% AEP) (Low Risk). The scale of the RoFfSW map extract included within the SFRA does not enable identification of individual sites; but does indicate a similar flood risk pattern to the Environment Agency on-line Long Term Flood Risk mapping.

Overall, the site is considered to be at a 'Low' risk of potential Surface Water (Pluvial) Flooding.

3.5 Sewer Flooding

The SFRA (2022) includes Sewer Flooding incident data obtained from Anglian Water Limited's DG5 Register, which covers the number of historic incidents of flooding based on a 4 digit postcode; and the subject site is within an area having recorded 10 incidents. There is no reason to anticipate the subject site has been impacted by sewer flooding.

The SFRA states that there are no locations within the Fenland jurisdiction that are considered at risk of foul flooding due to a lack of capacity in the system.

3.6 Groundwater Flooding

The Fenland SFRA (2022) states that the EA Catchment Flood Management Plans (CFMP) for the River Nene and the River Ouse do not indicate groundwater flooding problems within the Fenland jurisdiction.

The SFRA also lists identifying features that could be indicative of the potential risk of flooding from groundwater (based on EA and BGS[10] published data). None of the specific physical or hydrogeological features listed are prevalent in proximity to the subject site.

Based on available information, the site is considered at 'Low' risk of potential Groundwater Flooding.

3.7 Flooding from Artificial Sources

The Ouse and Nene Washes are important Flood Storage Areas and are therefore officially designated as reservoirs. The Nene Washes is located within the Fenland District.

[10] British Geological Survey

The EA Long Term Risk of Flooding website (https://check-long-term-flood-risk.service.gov.uk/map?easting=533188&northing=244378&map=SurfaceWater) confirms the site *is* at risk of Reservoir Flooding when there is also a risk of flooding from rivers. The village of Benwick is on the periphery of the area indicated to be at risk.

It should be noted that reservoirs in the UK do have a very good safety record; and the EA, as regulatory authority for the Reservoirs Act 1975 England and Wales, has a duty to annually inspect all large reservoirs to ensure compliance. **The risk of flooding from reservoirs is considered minimal.**

3.8 Internal Drainage Board (IDB)

The subject site is located within the Benwick IDB.

As such, approval should be sought from the IDB regarding any proposals to discharge Surface Water Drainage to external drainage infrastructure such as watercourses, ditches, or drains.

3.9 Critical Drainage Areas

Critical Drainage Areas (CDAs) are 'discrete geographical areas where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding in one or more Local Flood Risk Zones (LFRZ) during severe weather which can impact people property or local infrastructure'.

The Fenland SFRA (2022) confirms there are no defined CDAs within the Fenland Council jurisdiction.

3.10 Climate Change

Climate Change will potentially increase both the frequency and intensity of localised storms, which could heighten localised drainage problems. In general, the impacts of climate change should be assessed over the lifetime of a proposed development; and calculated in accordance with the National Planning Policy Framework (NPPF).

On 20th July 2021, the Environment Agency published Climate Change Allowance changes for the assessment of flood risk. The new CCAs for use in flood risk assessment are based on 'Management Catchments' (*replacing the former use of larger river basin districts*). The updated text in the NPPF states that: "All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property."

Appropriate Climate Change Allowances have been indirectly considered within Section 3.4 for long term Surface Water Flood Risk; but not directly for Fluvial Flood Risk on account of the paucity of available data.

4 Summary and Conclusion

4.1 FRA Summary Points

- Environment Agency flood zone mapping indicates that **'Benwick Community Primary School, High Street, Benwick, March, Cambridgeshire, PE15 0XA'** ('the site') is located within **Flood Zone 3**. The Fenland District Council SFRA (2022) indicates that **the site is within Flood Zone 3a.**

- In recognition of the flood risk setting for the site, a **Level 2 Flood Risk Assessment (FRA): Scoping Study** was conducted.

- **The RoFRaS Flood Rating for the site indicates the *maximum* risk to be a 'Medium' risk of flooding across the entire site (less than 1 in 30 [3.3%] but greater than 1 in 100 [1%] in any given year).**

- There are no surface water features or watercourses within the curtilage of the site. Several Surface Water Drains are located in proximity to the site, to the east, south, and west of the village. The closest drain being along the eastern side of the High Street <10m from the eastern site perimeter.

  The River Nene (Old Course) is located approximately 445m north of the site.

- **Historical Flooding:** There are no recorded incidents of flooding at the subject site (from any source).

- Published Ordnance Survey data suggests the site is flat, and at an approximate elevation of 0.00mAOD.

- Published British Geological Survey (BGS) records indicate that the bedrock beneath the site is the Oxford Clay Formation (an Unproductive Aquifer); which is overlain by Superficial Tidal Flat Deposits – 1 (a Secondary Undifferentiated Aquifer).

- **Fluvial Hydraulic Modelling:** In response to a Product 4 request, the EA confirmed there to be no specific modelling data covering the locality of the subject site. The EA considers the Flood Map For Planning (Rivers and Sea) to be the best available map. Potential Flood Elevations are therefore unknown at the subject site.

- **The overall Surface Water Flood Risk is considered to be 'Low',** as indicated by the EA Long Term Flood Risk mapping. There is 'No Risk' of flooding indicated for the 'High' risk scenario (greater than 3.3% [1 in 30]). For the 'Medium Risk' (between 1% [1 in 100] and 3.3% [1 in 30]) and 'Low Risk' scenarios (between 0.1% [1 in 1,000] and 1% [1 in 100]), potential surface water flooding is indicated within the playing field and south-east corner of the site. The potential risk of surface water flooding does not impact the footprint of the proposed new construction at the site.

- **The site is considered at 'Low' risk of potential Groundwater Flooding.**

- **The subject site is at risk of Reservoir Flooding** when there is also a risk of flooding from rivers. **The risk is considered minimal.**

- The subject site is located within the Benwick IDB.
- There are no defined Critical Drainage Areas (CDAs) within the Fenland jurisdiction.
- **Proposed Development:** At the time of preparing this Flood Risk Assessment (FRA) the proposed development comprised the following:

Option 01

- Remove the exiting Mobile Classroom Building;
- **Expansion to four (4No.) Permanent Classrooms (constructing two [2No.] new classrooms to replace the existing mobile classrooms);**
- **Provision of a new 180m^2 Hall;**
- Internal Improvements (*mostly concerning staff and pupil welfare facilities*);
- Retention of the existing Dining / Kitchen Facilities.

Option 02

- A**s per Option 01; except:**
- **Provision of a New Kitchen (with dry goods store, staff facilities, and servery / chair store);** and
- Provision of a Hall and External PE Store.

The increased footprint of the proposed new construction for each option is as follows:

Option 01: 361m^2

Option 02: 441m^2

4.2 Mitigation Measures

In considering flood Mitigation Measures appropriate to the site and the proposed development; the following key flood risk factors have been taken into consideration:

- The EA Flood Map for Planning indicates the site to be within Flood Zone 3a (and benefiting from flood defences).
- The RoFRaS rating indicates a 'Medium' potential risk of Fluvial Flooding.
- Potential Fluvial Flood Elevations are currently unknown.
- The site is considered to be at 'Low' risk of both Surface Water (Pluvial) Flooding and Groundwater Flooding.
- The site has not been impacted by historical flooding from any source.

4.2.1 Finished Floor Levels

The Development Plan does not specify a Finished Floor Level (FFL).

The proposed extension to the school comprises two potential Design Options. Both Option 01 and Option 02 would be internally linked to the existing school buildings. It would therefore be necessary to maintain level access between the existing building and the proposed new construction.

Although potential flood elevation is unknown, it is considered unlikely that the FFL of the new extension could have been practicably adjusted to respond to potential flood elevation, even if it were known.

It is therefore recommended that the FFL of the new construction would need to be equivalent to the FFL of the existing building(s).

Given the flood risk setting, the following Additional Precautionary Measures (extra flood resistance and resilience measures) are recommended for incorporation into the development design for new construction:

- Incorporate flood resistant design measures (such as raised electrical sockets); and
- Incorporate Anti-flood air bricks.

The use of flood resistant external doors is not considered practical in this case; unless such doors are already in place within the existing building.

4.2.2 Surface Water Management

A Surface Water Drainage Strategy is recommended to accompany the planning application.

4.2.3 Flood Warnings and Alerts

The subject site is located within an Environment Agency Flood Warning Area: (https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/FloodWarningAreas&Mode=spatial). Given the Flood Warning setting, occupants would be able to vacate prior to the onset of potential flooding.

4.2.4 Access and Evacuation

In the event of a flood evacuation scenario, Flood Zone 1 (dry ground) could be reached on exiting the site and proceeding south (right) along High Street and immediately right onto the B1036 Ramsey Street which exits the village to the south-west. This road should be followed until the village of Ramsey Forty Foot is reached, approximately 4.25km from Benwick. The village of Ramsey Forty Foot is within Flood Zone 1.

Benwick Community Primary School should be signed up to receive Environment Agency alerts and warnings. As such, sufficient warning should be possible so as to avoid evacuation through flood waters.

4.3 Concluding Comments

- The Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) database indicates the maximum potential fluvial flood risk across the site to be a 'Medium' risk.
- The potential risk from Surface and Groundwater Flooding is 'Low'.

- Mitigation Measures have been considered, and it is recommended that the Finished Floor Level (FFL) of the proposed extension (for either Option 01 or 02) be set as equivalent to the existing building. Additional precautionary measures are recommended.
- It is recognised, that if necessary, Benwick Community Primary School could be safely evacuated prior to potential impact from flooding (based on the use of EA Flood Alert and Warning protocol).
- This FRA should be reviewed if Development Plans are changed.

5 Closure

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by BOLD Environmental Ltd.

The 'vicinity' of the site for the purposes of the report, is defined as locations situated within an approximate 250m radius of the site, although certain sources of contamination and/or sensitive targets further than 250m of site have also been included. Advice provided within this report is based on current guidelines available at the time of writing. This report is subject to amendment in light of additional information becoming available or statutory consultee review, including the Environment Agency and Local Council.

This report is written in the context of an agreed scope of work between BOLD Environmental Ltd and the Client and should only be used in this specific context. Re-interpretation of this report in whole or part may become necessary if additional information becomes available or practices or legislation changes.

BOLD Environmental Ltd does not provide legal advice; the advice of the Client's legal advisors may also be required. BOLD Environmental Ltd Terms and Conditions apply.

6 References

Cambridgeshire County Surface Water Management Plan Countywide Update 2014, Final Report.

Cambridgeshire Flood Risk Management Strategy 2021 - 2027.

Department for Communities and Local Government (2018) National Planning Policy Framework.

Department for Communities and Local Government (2012) Technical Guidance to the National Planning Policy Framework.

Environment Agency (2022) Product 4: Detailed FRA / FCA Map and 'Fenland Flood Zone Improvements (Product 5) (ref: EAN/2022/276922 220819/AA11) (2022).

Pick Everard (2021) Milestone One Report for Benwick Primary School, Issue 1.0, 20th August 2021.

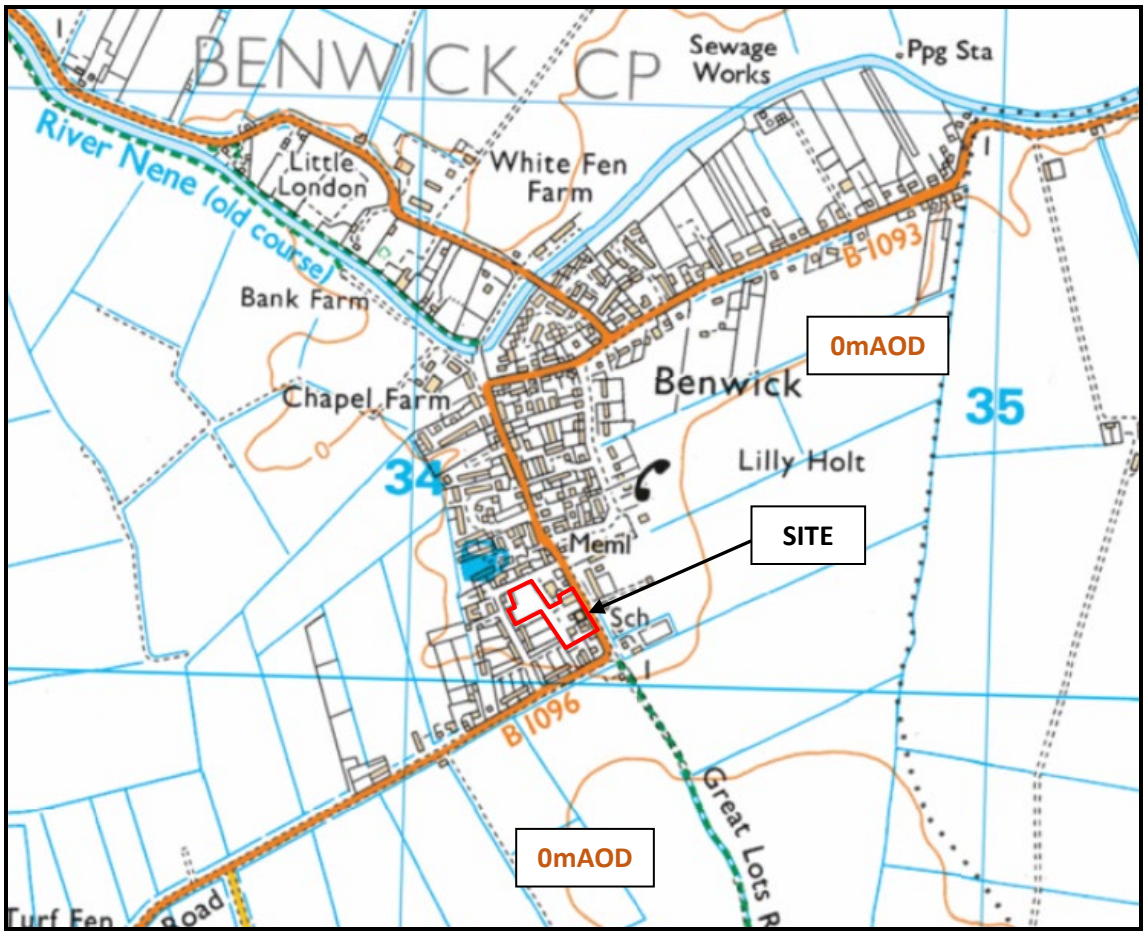
Royal Haskoning DHV (2022) Fenland Level 1 Strategic Flood Risk Assessment (SFRA) (June 2022).

Royal Haskoning DHV (2022) Fenland Outline Water Cycle Study (June 2022).

Scott Wilson (2011) Fenland District Council Level 1 Strategic Flood Risk Assessment (SFRA) (July 2011).

APPENDIX A Site Location Map and Current Site Layout

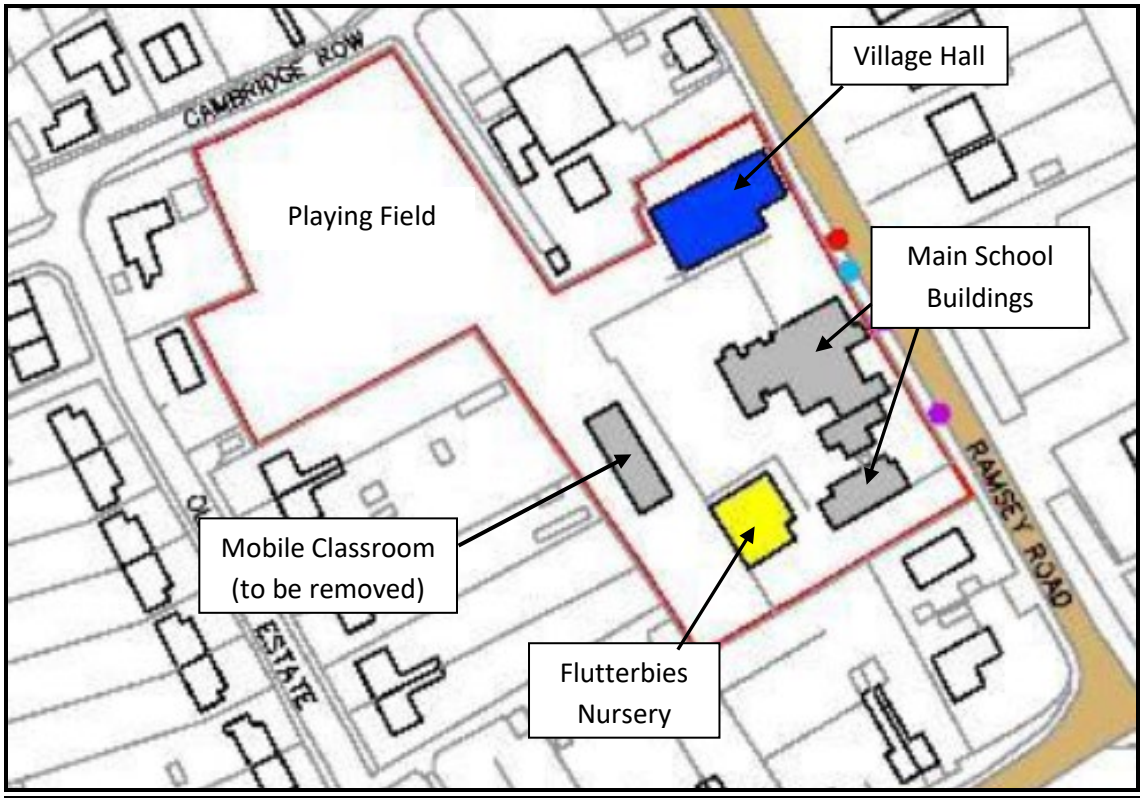
SITE LOCATION MAP: BENWICK COMMUNITY PRIMARY SCHOOL, HIGH STREET, BENWICK



Key: **THE SITE = Benwick Community Primary School, High Street, Benwick, PE15 0XA**

0mAOD = Ordnance Survey Contours

CURRENT SITE LAYOUT: BENWICK COMMUNITY PRIMARY SCHOOL, HIGH STREET, BENWICK



Key: **THE SITE = Benwick Community Primary School, High Street, Benwick, PE15 0XA**

APPENDIX B Development Plans

4.9 Existing General Arrangements

Figure 7: Existing General Arrangements – Benwick Primary School

5.2 Proposed General Arrangements 01

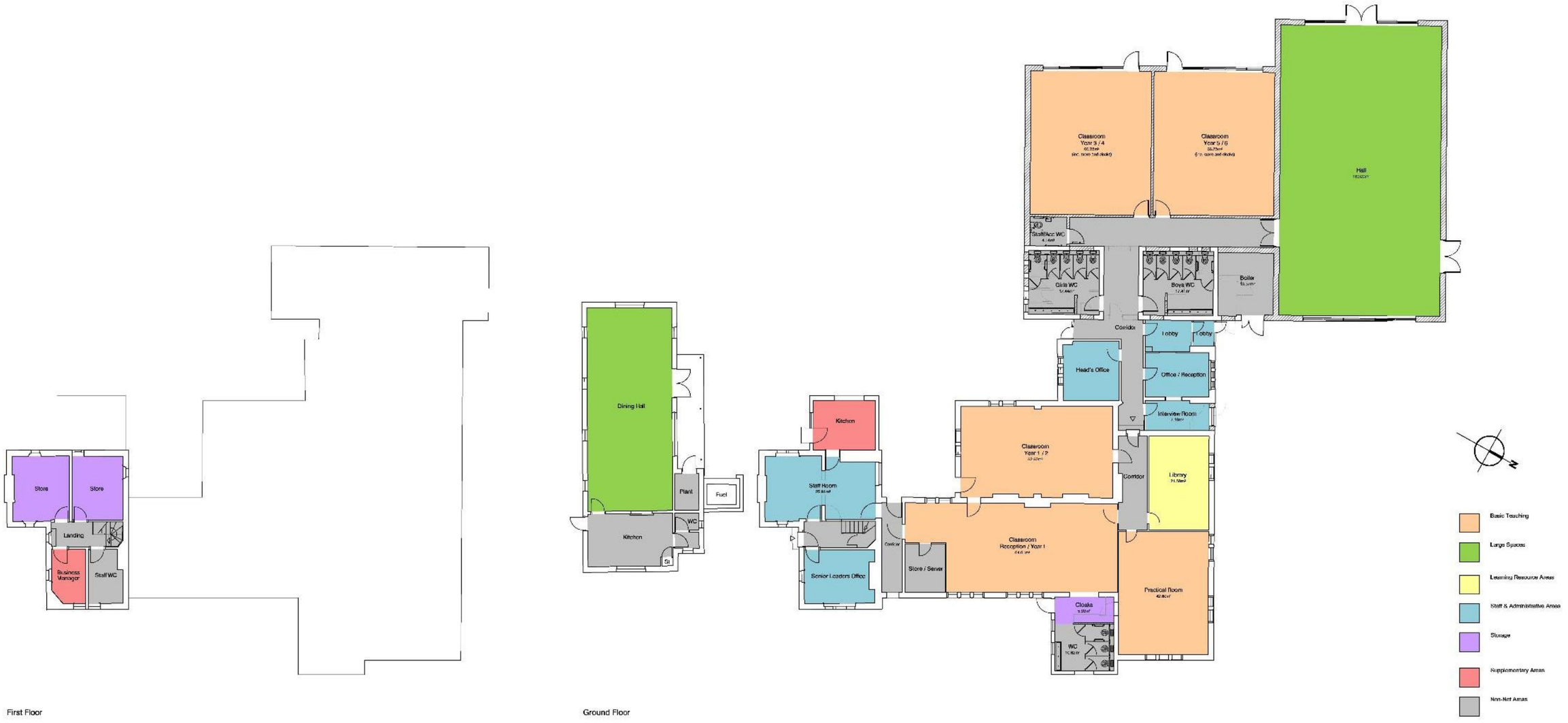


Figure 24: Proposed General Arrangements 01 - Benwick Primary School

5.3 Proposed General Arrangements 02

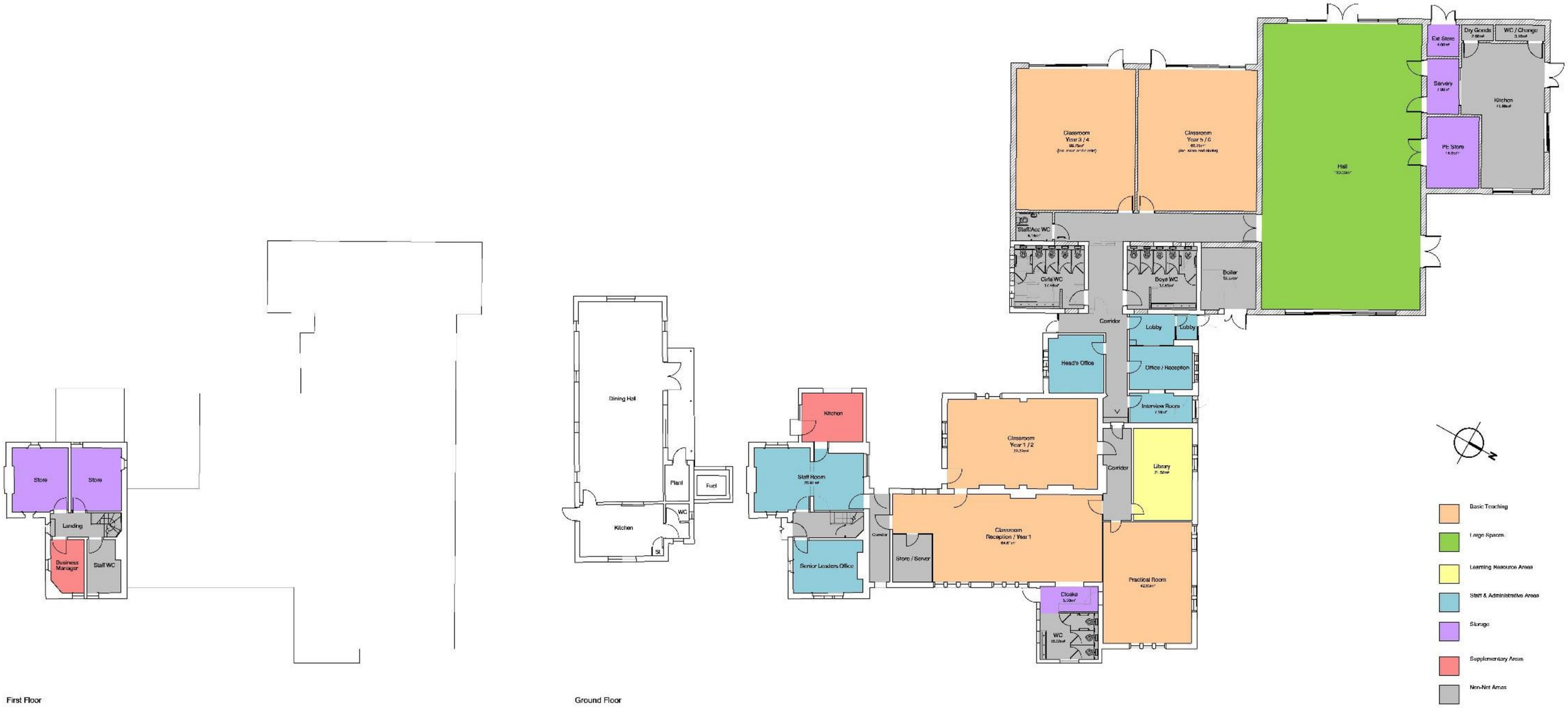
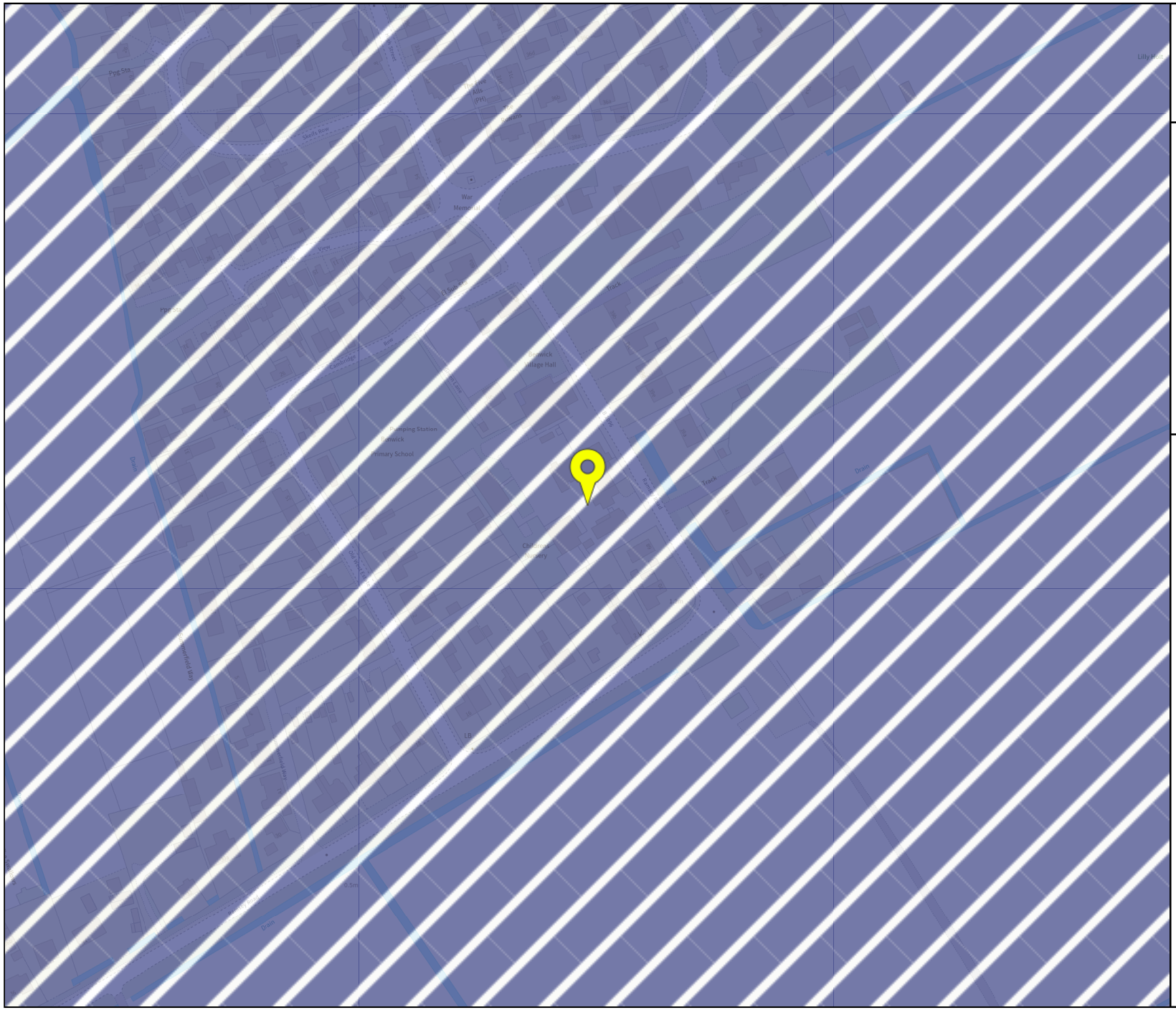


Figure 25: Proposed General Arrangements 002 - Benwick Primary School

APPENDIX C Flood Zone Map (EA map extracts)



Environment Agency

Flood map for planning

Your reference
Benwick Primary School

Location (easting/northing)
534293/290101

Scale
1:2500

Created
21 Sep 2022 11:24

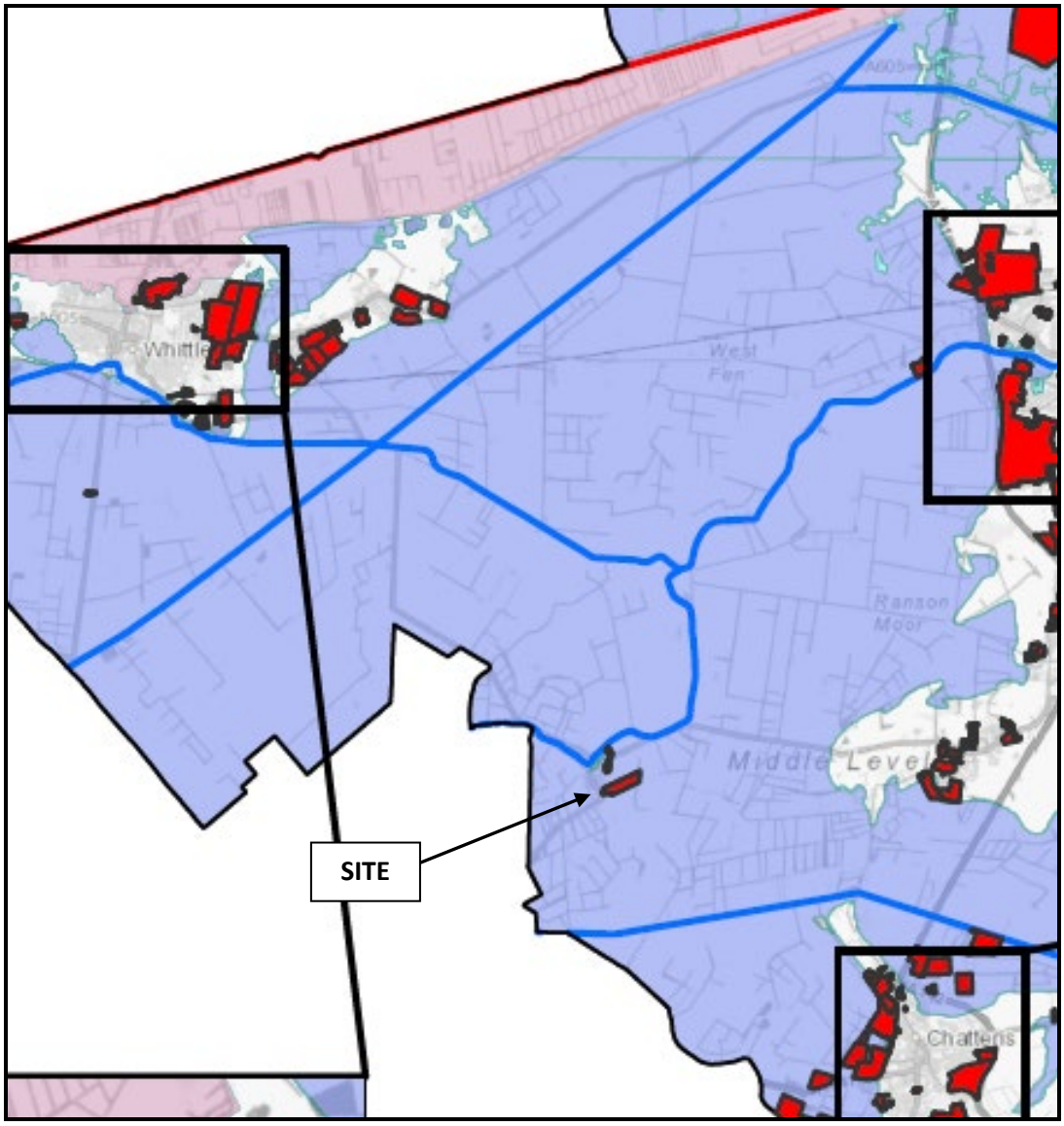
- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

FLOOD ZONE MAPPING

Flood Zone Mapping presented within the Fenland District Council Strategic Flood Risk Assessment (SFRA, 2022) indicates that the site is located within Flood Zone 3a.

An SFRA map extract is presented below:



Key: **THE SITE = Benwick Community Primary School, High Street, Benwick, PE15 0XA**

- Study Area Boundary
- All Potential Development Locations
- Areas benefiting from flood defences
- IDB Main Drain
- Main River

EA Flood Zones

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3a
- Flood Zone 3b

Source: Fenland Level 1 Strategic Flood Risk Assessment (SFRA) (June 2022)

RoFRaS MAPPING

The Environment Agency / Natural Resources Wales 'Risk of Flooding from Rivers and the Sea (RoFRaS) database' (Risk of Flooding from Rivers and Sea)[1] generates an indication of river and coastal flood risk based on a 50m grid. The database considers the probability that any flood defences (if present) will overtop or breach, and the distance from the river or sea.

The RoFRaS Flood Rating indicates the *maximum* risk to be a 'Medium' across the entire site (less than 1 in 30 [3.3%] but greater than 1 in 100 [1%] in any given year).

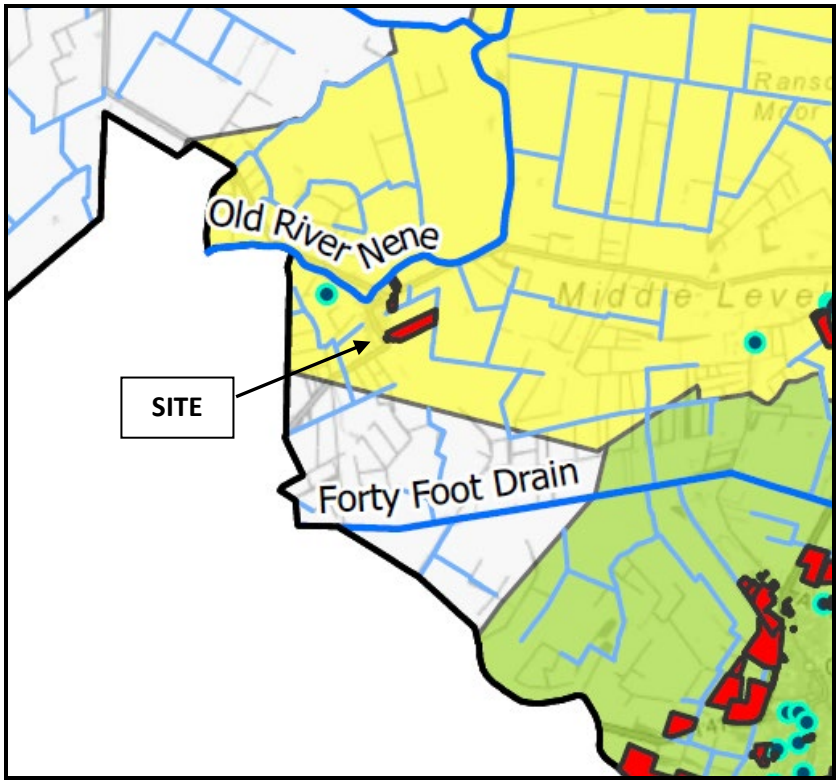
Key: **THE SITE = Benwick Community Primary School, High Street, Benwick, PE15 0XA**

[1] Open Government Licence

APPENDIX D Historical Flood Map (EA map extract)

HISTORIC FLOODING

The Fenland SFRA (2022) presents a Historical Flood Incidents map (based on data from the EA, Cambridgeshire County Council, IDBs and Anglian Water). There are no events indicated in close proximity to the subject site. A map extract from the SFRA is presented below:



Key: **THE SITE = Benwick Community Primary School, High Street, Benwick, PE15 0XA**

All Potential Development Locations
Study Area Boundary
Historic Incidents Records 2012-2020 Locations
(Source - Environment Agency, Cambridgeshire County Council)
Main River
IDB Main Drain
IDB Drain
Historic Flood Map
Flood Storage Area

Sewer Flooding Incidents within the postcode area (DG5)*
1 Incident
8 Incidents
10 Incidents
15 Incidents
28 Incidents
(Source - Anglian Water)

Source: Fenland Level 1 Strategic Flood Risk Assessment (SFRA) (June 2022)

APPENDIX E Surface Water (Pluvial) Flooding (EA map extracts)

EA SURFACE WATER FLOOD RISK

HIGH RISK SCENARIO

The following map extract is taken from the Environment Agency (EA) on-line Long Term Flood Risk mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/). The map extract depicts the 'High' risk flood scenario; where a 'High' risk is greater than 1 in 30 [3.3%] in any given year.

THE SITE = Benwick Community Primary School, High Street, Benwick, PE15 0XA

High Risk Flood Scenario Potential Flood Depth

= Over 900mm

= Between 300mm and 900mm

= Below 300mm

EA SURFACE WATER FLOOD RISK

MEDIUM RISK SCENARIO

The following map extract is taken from the Environment Agency (EA) on-line Long Term Flood Risk mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/). The map extract depicts the 'Medium' risk flood scenario; where a 'Medium' risk is between 1 in 100 [1%] and 1 in 30 [3.3%] in any given year.

THE SITE = Launton Park, Arkwright Road, Bicester, OX26 4UU

Medium Risk Flood Scenario Potential Flood Depth

= Over 900mm

= Between 300mm and 900mm

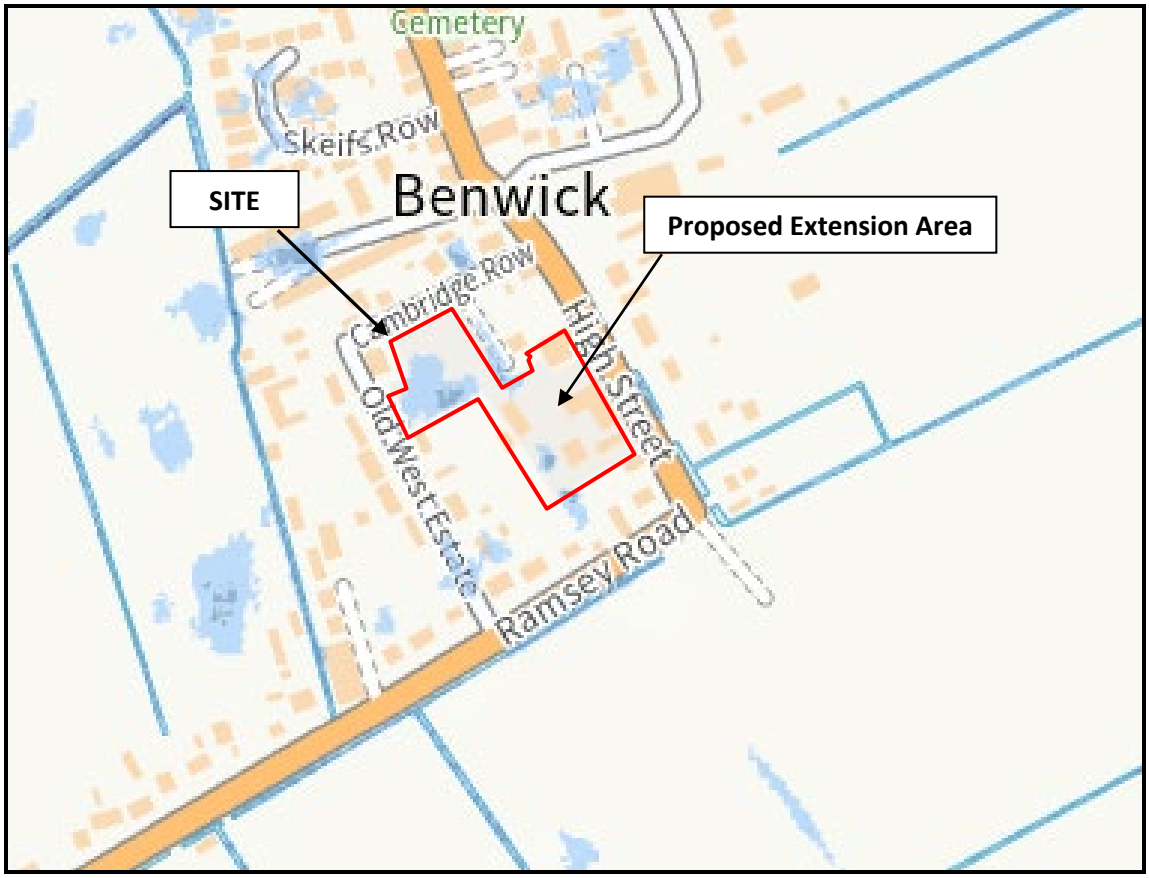
= Below 300mm

EA SURFACE WATER FLOOD RISK

LOW RISK SCENARIO

The following map extract is taken from the Environment Agency (EA) on-line Long Term Flood Risk mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/). The map extract depicts the 'Low' risk flood scenario; where a 'Low' risk is between 1 in 1,000 [0.1%] and 1 in 100 [1%] in any given year.

The map also indicates the area of the proposed extension to the school; which is not within an area potentially impacted by Surface Water Flooding.



THE SITE = Benwick Community Primary School, High Street, Benwick, PE15 0XA

Low Risk Flood Scenario **Potential Flood Depth**

= Over 900mm

= Between 300mm and 900mm

= Below 300mm