Operational Development Methodology

Effects of the Development on Local Air Quality

6.21 With regards to the operational phase, the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) planning development guidance (EPUK / IAQM Guidance)[1], summarised in **Appendix 6.1**, sets out criteria for when an Air Quality Assessment is required to accompany a planning application. The guidance states an Air Quality Assessment is required if there is:

- a change of more than 100 Light Duty Vehicles (LDV's) flows in Annual Average Daily Traffic (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere;
- a change of more than 25 Heavy Duty Vehicles (HDV) flows AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; or
- any combustion plant where the single or combined NOx emission rate is greater than 5 mg/sec.

6.22 The transport consultants, Waterman, have confirmed the trips generated by the Proposed Development would not result in a change of more than 100 LDVs or 25 HDVs (see Chapter 13).

6.23 A qualitative review of the operational traffic data against the criteria set out within the EPUK / IAQM Guidance was used to determine potential operational impacts of the Proposed Development.

6.24 The only combustion plant within the Proposed Development would be generators for emergency and life safety power supply only. These generators would use hydrotreated vegetable oil (HVO) fuel which burns cleaner than diesel and would be tested for less than 18 hours a year, ensuring the emergency generators would not lead to hourly exceedances of either NO_2 or PM_{10} objectives. The impact of the emergency generators have, therefore, not been considered further.

Predicted Future Exposure

6.25 A qualitative review of the baseline air quality conditions was used to determine the predicted future exposure of users of the Proposed Development.

Magnitude of Construction Impact

Dust Emissions

6.26 The potential impacts of construction activities on local air quality were based on professional judgement and with reference to the criteria set out in the IAQM Construction Guidance. Appropriate mitigation that would be implemented to minimise any adverse impacts on air quality have also been considered. Details of the assessors' experience and competence to undertake the dust assessment is provided in **Appendix 6.2**.

6.27 The assessment of the risk of dust impacts arising from the likely construction activities, as identified by the IAQM Construction Guidance, is based on the magnitude of potential dust emissions and the sensitivity of the area. The risk category matrix for construction activity types are presented in **Table 6.4** to **Table 6.7**.

1 Environmental Protection UK & Institute of Air Quality Management (2017), 'Land-Use Planning & Development Control: Planning for Air Quality', EPUK & IAQM, London

Table 6.4: Risk Category from Demolition Activities

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	LARGE	MEDIUM	SMALL
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 6.5: Risk Category from Earthworks Activities

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	LARGE	MEDIUM	SMALL
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 6.6: Risk Category from Construction Activities

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	LARGE	MEDIUM	SMALL
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 6.7: Risk Category from Trackout Activities

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	LARGE	MEDIUM	SMALL
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

6.28 The risk of dust impacts determined for each construction activity type is used to define the appropriate mitigation measures that should be applied. The IAQM Construction guidance recommends significance is only assigned to the effect after considering mitigation and assumes all actions to avoid or reduce the effects are inherent within the design of the Proposed Development. In the case of construction mitigation, via a CEMP, this would be secured by planning condition. Therefore, in this assessment no significance is identified for the pre-mitigation construction impacts.

6.29 However, to maintain consistency with the structure of this EIA and ES, pre-mitigation significance criteria, outlined below, has been applied which are based on professional judgement.

- Major adverse effect (significant) - Receptor is less than 20m from an active construction site;
- Moderate adverse effect (significant) - Receptor is 20m to 100m from an active construction site;
- Minor adverse effect (not significant) - Receptor is between 100m and 350m from an active construction site; and
- Negligible (not significant) - Receptor is over 350m from an active construction site.

6.30 IAQM outlines that experience of implementing mitigation measures for construction activities demonstrates that total mitigation is normally possible such that residual effects would not be 'significant'. Therefore, it follows that, within this assessment, no post-mitigation matrix of significance criteria is provided for the likely residual effects of the construction works.

Construction Vehicle and Plant Exhaust Emissions

6.31 The impact magnitude from construction vehicle and plant exhaust emissions on air quality were based on professional judgement.

Magnitude of Impact of Operational Development

6.32 The impact magnitude from the Proposed Development on local air quality were based on EPUK / IAQM Guidance and professional judgement of a competent professional who is suitably qualified.

Assessment of Significance

Construction

Dust Emissions

6.33 The significance of the potential effects of dust emissions arising from construction activities on local air quality are based on professional judgement and with reference to the criteria set out in the IAQM Construction Guidance.

Construction Vehicle and Plant Exhaust Emissions

6.34 The significance of the effects of construction vehicle and plant emissions was based on professional judgement of a competent professional who is suitably qualified (see **Appendix 6.2**: Assessor Experience).

Operational Development

6.35 Following the approach to assessing significance outlined in the EPUK / IAQM Guidance, the significance of likely effects of the completed and operational Proposed Development on air quality has been established through professional judgement and the consideration of the following factors:

6.36 The geographical extent (local, district, regional or national);

- Their duration (effects resulting from the completed and operational Proposed Development are classed as 'long-term' effects);
- Their reversibility (temporary or permanent);
- The magnitude of changes in pollution concentrations;
- The exceedance of standards (AQS objectives); and
- Changes in pollutant exposure.

Assumptions and Limitations

6.37 General assumptions and limitations which apply to all technical chapters are set out in **Chapter 2: EIA Methodology**.

6.38 Due to the COVID-19 pandemic, 2020 and 2021 monitoring data was not considered representative of baseline air quality conditions at and surrounding the Application Site. At the time of writing, 2022 monitoring data was not available, 2019 monitoring data has, therefore, been used as it was considered most representative of existing baseline air quality conditions

and robust for the purposes of assessment.

6.39 For the purposes of the nuisance dust assessment, it has been assumed that construction works would be carried out at the boundary of the Site throughout the construction phase. This approach would provide a worst-case assessment.

6.40 When assessing the overlap of the construction and operational phases of the Development, a worst-case approach has been undertaken. The assessment has assumed there is the highest level of site occupation whilst construction was still ongoing.

Existing Baseline Conditions

Cambridge City Council Review and Assessment Process

6.41 In 2004, Cambridge City Council (CCC) declared an Air Quality Management Area (AQMA) for exceedances of the annual mean NO_2 Air Quality Strategy (AQS) Objective. The AQMA covers an area encompassing the inner ring road and all the land within it (including a buffer zone around the ring road and its junctions with main feeder roads). The Site is located within this AQMA.

Cambridge City Council Local Monitoring

6.42 CCC currently undertakes monitoring of NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) at five automatic monitors. Details of these are:

- Newmarket Road (CM3): a roadside monitor, located approximately 0.4km north-west of the Site, measuring NO_2 and $PM_{2.5}$;
- Montague Road (CM2): a roadside monitor, located approximately 1.1km north-west of the Site, measuring NO_2 and PM_{10};
- Parker Street (CM4): a roadside monitor, located approximately 1.3km south-west of the Site, measuring NO_2 and PM_{10};
- Gonville Place (CM1): a roadside monitor, located approximately 1.4km south-west of the Site, measuring NO_2, PM_{10} and $PM_{2.5}$; and
- Regent Street (CM5): a roadside monitor, located approximately 1.5km south-west of the Site, measuring NO_2.
- Monitored concentrations from the five automatic monitors are presented in **Table 6.8** below.

Table 6.8: Measured Concentrations at the five CCC Automatic Monitors

ID	POLLUTANT	AVERAGING PERIOD	AQS OBJECTIVE	2016	2017	2018	2019
CM3	NO2	Annual Mean (µg/m3)	40µg/m3	24	26	25	22
		1-Hour Mean (No. of Hours)	200µg/m3 not to be exceeded more than 18 times a year	0	0	0	0
	PM2.5	Annual Mean (µg/m3)	25µg/m3	11	11	10	10

ID	POLLUTANT	AVERAGING PERIOD	AQS OBJECTIVE	2016	2017	2018	2019
CM2	NO_2	Annual Mean ($\mu g/m^3$)	40µg/m³	27	24	25	22
		1-Hour Mean (No. of Hours)	200µg/m³ not to be exceeded more than 18 times a year	0	0	1	0
	PM_{10}	Annual Mean ($\mu g/m^3$)	40µg/m³	22	20	21	22
		24-Hour Mean (No. of Days)	50µg/m³ not to be exceeded more than 35 times a year	2	3	1	6
CM4	NO_2	Annual Mean ($\mu g/m^3$)	40µg/m³	**41**	37	32	33
		1-Hour Mean (No. of Hours)	200µg/m³ not to be exceeded more than 18 times a year	0	0	0	0
	PM_{10}	Annual Mean ($\mu g/m^3$)	40µg/m³	22	21	23	21
		24-Hour Mean (No. of Days)	50µg/m³ not to be exceeded more than 35 times a year	4	4	1	5
CM1	NO_2	Annual Mean ($\mu g/m^3$)	40µg/m³	36	31	30	28
		1-Hour Mean (No. of Hours)	200µg/m³ not to be exceeded more than 18 times a year	0	0	0	0
	PM_{10}	Annual Mean ($\mu g/m^3$)	40µg/m³	20	18	19	19
		24-Hour Mean (No. of Days)	50µg/m³ not to be exceeded more than 35 times a year	1	3	1	2
	$PM_{2.5}$	Annual Mean ($\mu g/m^3$)	25µg/m³	15	15	15	14
CM5	NO_2	Annual Mean ($\mu g/m^3$)	40µg/m³	32	29	26	27
		1-Hour Mean (No. of Hours)	200µg/m³ not to be exceeded more than 18 times a year	0	0	0	0

Source: Data obtained from the CCC Air Quality Annual Status Report, June 2020[2]

6.43 The monitoring results in **Table 6.8** show that PM_{10} and $PM_{2.5}$ AQS objectives were met at all five automatic monitors in CCC from 2016 to 2019. The annual mean NO_2 AQS objective was met at all monitors in all years with the exception of the CM4 monitor in 2016.

6.44 Pollutant concentrations have generally reduced or remained similar from 2016 to 2019. 24-hour mean PM_{10} was seen to increase between 2016 and 2019 at the CM2, CM4 and CM1 automatic monitors.

2 Cambridge City Council Air Quality Annual Status Report, June 2020

6.45 The 2019 annual mean $PM_{2.5}$ concentration at the CM3 monitor has reached the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 target to be equal to or less than 10 µg/m³ by the end of 31st December 2040 already.

6.46 In 2019, CCC also measured annual mean NO_2 concentrations at 69 locations using diffusion tubes. The results for the nine NO_2 diffusion tubes within 1km of the Site are presented in **Table 6.9**.

Table 6.9: Measured NO_2 Concentrations at CCC Diffusion Tubes within 1km of the Site

ID	LOCATION	CLASSIFICATION	DISTANCE TO SITE (KM)	ANNUAL MEAN NO2 CONCENTRATION (MG/M3)			
				2016	2017	2018	2019
DT56	Coldhams Lane 2	Roadside	0.2	27	23	23	20
DT61	Newmarket Road 3	Roadside	0.4	-	-	33	34
DT7	Newmarket Road 1	Roadside	0.5	35	32	33	31
DT35	Abbey Road	Roadside	0.6	21	19	17	17
DT17	Coldhams Lane	Roadside	0.6	24	22	21	22
DT13	East Road	Roadside	0.8	26	24	24	22
DT20	Elizabeth Way	Roadside	0.9	31	26	27	26
DT14	Mill Road	Roadside	0.9	25	24	23	21
DT39	Maids Causeway	Kerbside	1.0	32	28	30	27

Notes: Data obtained from the CCC Air Quality Annual Status Report, June 2020

6.47 The results in **Table 6.9** show the annual mean NO_2 AQS objective of 40µg/m³ was met at all nine of the closest diffusion tubes closest to the Site from 2016 to 2019. Annual mean NO_2 concentrations reduced between 2016 and 2019 at eight of the nine diffusion tubes. The annual mean NO_2 concentration at DT61 on Newmarket Road 3, increased slightly from 2018 to 2019.

6.48 In addition to the monitoring undertaken by CCC, background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ are available from the Defra Air Quality Archive for 1x1km grid squares for assessment years between 2018 and 2030. **Table 6.10** presents the Defra background concentrations for the grid square the Site is located within (546500, 258500).

Table 6.10: Defra Background Maps in 2019 for the Grid Square of the Site

POLLUTANT	AQS OBJECTIVE	2019 ANNUAL MEAN CONCENTRATION (MG/M³)
NO_x	-	19.5
NO_2	40µg/m³	14.3
PM_{10}	40µg/m³	16.2
$PM_{2.5}$	25µg/m³	10.8

Data Source: http://uk-air.defra.gov.uk

6.49 The data in **Table 6.10** shows that all pollutants are below the respective AQS objectives.

Evolution of the Baseline Conditions without Development

6.50 Baseline NO_2 concentrations are likely to decrease in the future after the UK Government's announcement (in July 2017) that new diesel or petrol vehicles will not be sold in the UK from 2030. A general reduction in NO_2 concentrations is already evident in recent years as shown by the monitoring results in **Table 6.8** and **Table 6.9**.

Potential Impacts

Construction

6.51 Construction activities of the Development have the potential to affect local air quality through Demolition, Earthworks, Construction and Trackout activities, as described above.

6.52 The Site is in a predominantly commercial and residential area - the nearest sensitive receptors are residential properties to the south-west of the Site on York Street, to the south of the Site on Sleaford Street and to the north-west of the Site on St Matthew's Gardens all within 20m of the Site boundary. Additionally, Lindeck Dr J medical practice is located within 20m of the Site along York Street, and Brunswick Nursery School is located approximately 250m west of the Site.

6.53 There are no designated ecological sites surrounding the Site. Ecology has therefore not been considered further in this assessment.

Dust Emissions

Demolition

6.54 The total volume of building to be demolished is estimated to be above 50,000m^3. Based on this and considering the criteria in step 2A of the IAQM guidance, the potential dust emissions during demolition activities could be of large magnitude.

Earthworks

6.55 The Site area is approximately 61,000m^2. Based on this and considering the criteria in step 2A of the IAQM guidance, the potential dust emissions during earthworks activities could be of large magnitude.

Construction

6.56 The total volume of buildings to be constructed could exceed 100,000m^3. Based on the criteria in step 2A of the IAQM guidance, the potential dust emissions during construction activities would be of large magnitude.

Trackout

6.57 The number of HDV's leaving the Site would peak at over 50 HDV outward movements in any one day. Based on this and considering the criteria in step 2A of the IAQM guidance, the potential for dust emissions due to trackout activities would be of large magnitude.

Sensitivity of the area

6.58 The sensitivity of the area to each main activity has been assessed based on the number and distance of the nearest sensitive receptors to the activity, and the sensitivity of these receptors to dust soiling and human health.

Sensitivities of People to Dust Soiling Effects

6.59 There are estimated to be over 100 highly sensitive receptors within 20m of the Site boundary. On this basis (as set out in Table 2 of the IAQM guidance) the sensitivity of the area to dust soiling is high.

Sensitivities of People to the Health Effects of PM_{10}

6.60 The 2019 monitored annual mean PM_{10} concentration was 22µg/m^3 at the Montague Road (CM2) automatic monitor - below the annual mean AQS objective for PM_{10} of 40µg/m^3. There are more than 100 high sensitivity receptors within 20m of the Site boundary. On this basis (as set out in Table 3 of the IAQM guidance) The sensitivity of the area to human health is medium.

Dust Risk Summary

6.61 The dust risk categories, based on the potential magnitude of dust emissions and the sensitivity of the area to dust, are presented in **Table 6.11**.

Table 6.11: Summary of Risk

RECEPTOR SENSITIVITY	SENSITIVITY OF THE SURROUNDING AREA			
	DEMOLITION	EARTHWORKS	CONSTRUCTION	TRACKOUT
Dust Soiling	High Risk	High Risk	High Risk	High Risk
Human Health	High Risk	Medium Risk	Medium Risk	Medium Risk

6.62 The Site is considered high risk to dust soiling and human health impacts. Mitigation would be required to ensure that adverse impacts be minimised, reduced and, where possible, eliminated.

Construction Vehicle and Plant Exhaust Emissions

6.63 During the construction phase of the Proposed Development, the number of HDV's would peak above 50 HDV outward movements in any one day. Considering the sensitivity of the surrounding residential area and increased traffic, it is considered, the potential impact of construction vehicles on air quality would in the worst-case, result in a temporary, local, adverse effect of minor significance during the construction period.

6.64 As noted above the constructive vehicle numbers and phasing is indicative for this Outline Application. In accordance with the IAQM Construction Guidance and EPUK / IAQM Guidance, if required, the impact of construction vehicle exhaust emissions would be modelled for each detailed phase of the Development - secured by a suitably worded planning condition.

6.65 Any emissions from plant operating on the Site would be very small in comparison to the emissions from traffic movements on the roads adjacent to the Site. It is, therefore, considered the impact of construction plant on pollutant concentrations would be **negligible**.

Operational Development

Effects of the Development on Local Air Quality

6.66 The Proposed Development would result in a reduction of car parking spaces and subsequent reduction in vehicle movements, in annual average daily traffic, when compared to the existing site. It is predicted the Proposed Development would have a **minor beneficial** impact on local air quality.

Predicted Future Exposure

6.67 The centre of Site is located approximately 200m from the DT56 Coldham's Lane 2 roadside diffusion tube which is considered representative of annual mean NO_2 concentrations the Site could be exposed to. The monitored 2019 annual mean NO_2 concentration of 20µg/m^3 is below the AQS objective.

6.68 The CM3 Newmarket Road automatic monitor, located 0.4km north-west of the centre of the Site, is considered representative of $PM_{2.5}$ concentrations at the Site. The 2019 annual mean $PM_{2.5}$ concentration was below the AQS objective.

6.69 The CM2 Montague Road automatic monitor, located 1.1km north-west of the Site, is considered representative of PM_{10} concentrations at the Site. The 2019 PM_{10} concentrations at the CM2 Montague Road automatic monitor were below the AQS objectives for both annual mean and 24-hour mean.

6.70 Based on the pollutant concentrations at the monitors above (and shown in **Table 6.8** and **Table 6.9**), it is considered, the AQS objectives are likely to be met for future users of the Site. The impact on future users of the Development would be negligible.

Overlap of Construction and Operational Phases

6.71 If the construction and operational phases overlap, the overlap would have the potential to impact local air quality.

Dust Emissions

6.72 During the construction phase, the Site is considered high risk to dust soiling and human health impacts. Mitigation would be required to ensure that adverse impacts on future users of the Proposed Development be minimised, reduced and, where possible, eliminated.

Vehicle and Plant Exhaust Emissions

6.73 The pollutant concentrations of NO_2, PM_{10} and $PM_{2.5}$ are significantly below the AQS objectives at monitors considered representative of pollutant concentrations at the Site. Construction vehicle and plant exhaust emissions were therefore considered to have a negligible effect on the future users of the Proposed Development.

6.74 The Proposed Development would result in a reduction of car parking spaces and subsequent reduction in vehicle movements, in annual average daily traffic, when compared to the existing site. The effect of vehicles during the overlap of construction and operation would be less than the peak construction phase. In the worst-case, the potential impact of construction and operational vehicles would result in a temporary, local, adverse effect of minor significance during the construction period.

Evaluation of Predicted Impacts

Construction

Dust Emissions

6.75 As outlined in **Table 6.11**, the Site is a high-risk site, due to dust soiling and human health impacts.

6.76 The impact of construction dust emissions, in the absence of mitigation, could give rise to:

- Temporary, local effects of major adverse significance at receptors within 20m of the Site boundary;
- Temporary, local effects of moderate adverse significance at receptors between 20m and 100m of the Site boundary;
- Temporary, local effects of minor adverse significance at receptors between 100m and 350m of the Site boundary; and
- Negligible effects at receptors over 350m from the Site boundary.

6.77 Consequently, a range of environmental management controls would be developed with reference to the IAQM guidance for high-risk sites. The mitigation measures would be included within a CEMP and implemented to prevent the release of dust entering the atmosphere and / or being deposited on nearby receptors. An outline CEMP has been prepared in support of the planning application and details measures to control dust. The CEMP will be agreed with CCC and secured by planning condition.

Construction Vehicle and Plant Exhaust Emissions

6.78 Considering the sensitivity of the surrounding residential and commercial area, it is considered, the potential impact of construction vehicles on air quality would be in the worst-case, result in a temporary, local, adverse effect of **minor significance** during the construction period.

6.79 Any emissions from plant operating on the Site would be very small in comparison to the emissions from traffic movements on the roads adjacent to the Site. It is therefore considered that even in the absence of mitigation, their likely effect on local air quality would be **negligible**.

Operational Development

Effects of the Development on Local Air Quality

6.80 The Proposed Development would result in a reduction of car parking spaces and subsequent reduction in vehicle movements, in annual average daily traffic, when compared to the existing site. Additionally, the only combustion plant within the Proposed Development would be generators for emergency and life safety power supply only. These generators would use hydrotreated vegetable oil (HVO) fuel which burns cleaner than diesel and would be tested for less than 18 hours a year, ensuring the emergency generators would not lead to hourly exceedances of either NO_2 or PM_{10} objectives. The impact of the emergency generators have, therefore, not been considered further.

6.81 The Proposed Development would be in accordance with Planning Policy 36 of the Cambridge City Local Plan. Policy 36 details that any new development should not have an adverse effect on air quality within the AQMA.

6.82 The Cambridge Air Quality Action Plan has the following three key priorities:

- Priority 1 – Reduce emissions in the central areas of Cambridge;
- Priority 2 – Reduce emissions across Cambridge; and
- Priority 3 – Keep emissions low in the future.

6.83 As above, the Proposed Development would have a **minor beneficial** impact on local air quality and would be in line with the three priorities of the Cambridge Air Quality Action Plan.

Predicted Future Exposure

6.84 It is predicted, the Proposed Development would have a **negligible** effect on future users of the Development.

Overlap of Construction and Operational Phases

6.85 It is predicted, the overlap of the construction and operational phases of the Proposed Development would not exceed the level of effects already identified in the Construction and Operational Development assessments set out above.

Mitigation

Construction

Dust Emissions

6.86 A range of environmental management controls would be developed with reference to the IAQM guidance for high-risk sites. The mitigation measures are included within the outline CEMP prepared in support of the planning application. These measures will prevent the release of dust entering the atmosphere and / or being deposited on nearby receptors. The CEMP will be secured by planning condition.

6.87 Mitigation measures are routinely and successfully applied to construction projects throughout the UK and are proven to significantly reduce the potential for adverse nuisance dust effects associated with the various stages of the construction work.

Construction Vehicle and Plant Exhaust Emissions

6.88 All construction traffic logistics would be agreed with CCC as part of the CEMP. Consideration would also be given to the avoidance, or limited use, of traffic routes in proximity to sensitive uses (i.e. residential roads etc.) and the avoidance, or limited use, of roads during peak hours, where practicable. The likely residual effect of construction vehicles entering and egressing the Site to air quality would be **negligible**.

6.89 No mitigation measures are proposed to mitigate against construction plant emissions.

Operational Development

6.90 No mitigation measures are required to mitigate against the operational development. However, car club spaces are proposed and rapid electric vehicle charging infrastructure would be provided for 22 car park spaces, with the remaining spaces with passive electric vehicle charging infrastructure. The car club spaces and electric vehicle charging infrastructure would keep emissions low in the future, in accordance with the Cambridge Air Quality Action Plan.

Overlap of Construction and Operational Phases

6.91 No further mitigation measures from those set out above would be required to mitigate against the overlap of the construction and operational phases of the Development.

Residual Effects

Construction

Dust Emissions

6.92 Following the implementation of the mitigation measures mentioned above, the residual effect due to dust emissions would be **negligible**.

Construction Vehicle and Plant Exhaust Emissions

6.93 The likely residual effect of construction vehicles entering and egressing the Site to air quality would be **negligible**.

6.94 Even in the absence of mitigation, the likely effect of any emissions from plant operation on the Site is considered to be **negligible.** This would therefore remain the likely residual effect.

Operational Development

6.95 No mitigation measures are required to mitigate against the operational development. Residual effects are that of the predicted effects which are **minor beneficial.**

Overlap of Construction and Operational Phases

6.96 No mitigation measures are required to mitigate against the overlap of the construction and operational phases.

Monitoring

6.97 A range of measures to minimise or prevent dust and reduce exhaust emissions generated from construction activities, inclusive of monitoring, would be set out in a Dust Management Plan and implemented throughout the construction phase. Construction monitoring would be agreed with CCC and would be developed with reference to the IAQM Construction Guidance. The Site is a high-risk site in relation to nuisance dust emissions, therefore, PM_{10} monitoring would be required during construction using two automatic real-time particulate monitors.

6.98 CCC would continue to monitor local air quality using diffusion tubes across their administrative boundary.

Summary of Impacts

Construction

Dust Emissions

6.99 Following the implementation of a range of environmental management controls, included within the CEMP, the residual effect due to dust emissions would be **negligible**.

Construction Vehicle and Plant Exhaust Emissions

6.100 The likely residual effect of construction vehicles entering and egressing the Site to air quality would be **negligible**.

6.101 Even in the absence of mitigation, the likely effect of any emissions from plant operation on the Site is considered to be **negligible**. This would, therefore, remain as the likely residual effect.

Operational Development

6.102 No mitigation measures are required as part of the operational phase.

6.103 A summary of impacts can be found in **Table 6.12.**

Table 6.12: Summary of Impacts*: Air Quality*

DESCRIPTION OF IMPACT	IMPACT BEFORE MITIGATION							MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	ADVERSE/BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Impact of Construction Dust Emission - receptors within 20m of the Site boundary	Loc	High	High	Adv	Rev	ST	Maj	Implementation of a range of environmental management controls as set out in the IAQM Guidance for high-risk sites. These would be set out in a CEMP which is anticipated to be a condition on any future planning consent.	Adv	Rev	ST	Neg
Impact of Construction Dust Emission - receptors within 20m-100m of the Site boundary	Loc	High	Med	Adv	Rev	ST	Mod	Implementation of a range of environmental management controls as set out in the IAQM Guidance for high-risk sites. These would be set out in a CEMP which is anticipated to be a condition on any future planning consent.	Adv	Rev	ST	Neg
Impact of Construction Dust Emission - receptors within 100-350m of the Site boundary	Loc	High	Low	Adv	Rev	ST	Min	Implementation of a range of environmental management controls as set out in the IAQM Guidance for high-risk sites. These would be set out in a CEMP which is anticipated to be a condition on any future planning consent.	Adv	Rev	ST	Neg
Impact of Construction Dust Emission - receptors over 350m of the Site boundary	Loc	High	Low	Adv.	Rev	ST	Neg	Implementation of a range of environmental management controls as set out in the IAQM Guidance for high-risk sites. These would be set out in a CEMP which is anticipated to be a condition on any future planning consent.	Adv	Rev	ST	Neg

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Construction Vehicle Exhaust Emissions	Loc	High	Low	Adv	Rev	ST	Min	All construction traffic logistics would be agreed with CCC as part of the CEMP. Consideration would also be given to the avoidance, or limited use, of traffic routes in proximity to sensitive uses (i.e. residential roads etc.) and the avoidance, or limited use, of roads during peak hours, where practicable.	Adv	Rev	ST	Neg
Construction Plant Exhaust Emissions	Loc	High	Low	Adv	Rev	ST	Neg	Implementation of a range of environmental management controls as set out in the IAQM Guidance for high-risk sites. These would be set out in a CEMP which is anticipated to be a condition on any future planning consent.	Adv	Rev	ST	Neg
Effects of the Development on Local Air Quality	Loc	High	Low	Ben	Irrev	LT	Min	None proposed.	Ben	Irrev	LT	Min

Key:

Loc: Local	Med: Medium	Min: Minor	Adv: Adverse	Neg: Negligible	LT: Long-Term
Mod: Moderate	Ben: Beneficial	Irrev: Irreversible	Rev: Reversible	ST: Short Term	

Cultural Heritage

7

7.0 Cultural Heritage

Introduction

7.1 This Chapter addresses the approach and findings of the assessment of the potential impacts of Proposed Development on built heritage. It refers to the findings of the Heritage Statement undertaken by Bidwells which can be found within **Appendix 7.1**.

Potential Impacts

7.2 Effects on the historic environment can arise through direct physical impacts, impacts on setting or indirect impacts.

7.3 Direct physical impacts describe those development activities that directly cause damage to the fabric of a heritage asset. Typically, these activities are related to construction works and will only occur within the Site and may consist of the following;

- Site set-up works, including contractors compound set-up and associated temporary services, levelling work and other preparatory groundworks including remediation for unexploded ordnance and chemical contaminants;
- Construction including demolition, earthworks, foundation excavation or pile installation, service installation, road construction and visual impacts resulting from construction cranes and building activity;
- Landscaping, including ground reduction or levelling and creation of attenuation tanks and ponds; and
- The visual, acoustic, traffic and other effects of the completed development on the significance or setting of built and historic landscape heritage assets.

7.4 An impact on the setting of a heritage asset occurs when the presence of a development changes the surroundings of a heritage asset in such a way that it affects (positively or negatively) the heritage significance of that asset. Visual impacts are most commonly encountered but other environmental factors such as noise, light or air quality can be relevant in some cases. Impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning but they are only likely to lead to significant effects during the prolonged operational life of the development.

7.5 Indirect impacts describe secondary processes, triggered by the development, that lead to the degradation or preservation of heritage assets. For example, changes to the setting of a building may affect the viability of its current use and thus lead to dereliction.

7.6 Potential impacts on the settings of heritage assets are identified from an initial desk-based appraisal of data from the National Heritage List for England and the Cambridgeshire Historic Environment Record (HER) and consideration of historic mapping. Where this initial appraisal has identified the potential for a significant effect, the asset has been visited to define baseline conditions and identify key viewpoints.

Methodology

7.7 In order to understand which assets to consider, we have referred to definitions in the NPPF and PPG.

7.8 A heritage asset is defined within the National Planning Policy Framework as: "*a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing)*" (NPPF Annex 2: Glossary)

7.9 'Designated' assets have been identified under the relevant legislation and policy including, but not limited to: World Heritage Sites, Registered Park & Gardens, Listed Buildings, and Conservation Areas. 'Non-designated' heritage assets are assets which fall below the national criteria for designation.

7.10 The absence of a national designation should not be taken to mean that an asset does not hold any heritage interest. The Planning Policy Guidance (PPG) states that *"non-designated heritage assets are buildings, monuments, sites, places, areas or landscapes identified by plan-making bodies as having a degree of heritage significance meriting consideration in planning decisions, but which do not meet the criteria for designated heritage assets*." (Paragraph: 039 Reference ID: 18a-039-20190723)

7.11 The PPG goes on to clarify that "*a substantial majority of buildings have little or no heritage significance and thus do not constitute heritage assets. Only a minority have enough heritage significance to merit identification as non-designated heritage assets*."

Significance of Effect Criteria

Significance (Value/Importance) of Heritage Assets

7.12 It is important to be proportionate in assessing significance (value/importance) as required in both national policy and guidance set out in paragraph 189 of the NPPF.

7.13 The Historic England document 'Conservation Principles' states that "*understanding a place and assessing its significance demands the application of a systematic and consistent process, which is appropriate and proportionate in scope and depth to the decision to be made, or the purpose of the assessment.*"

7.14 The document goes on to set out the following process for assessment of significance, but it does note that not all of the stages highlighted are applicable to all places/assets.

- Understanding the fabric and evolution of the asset;
- Identify who values the asset, and why they do so;
- Relate identified heritage values to the fabric of the asset;
- Consider the relative importance of those identified values;
- Consider the contribution of associated objects and collections;
- Consider the contribution made by setting and context;
- Compare the place with other assets sharing similar values; and
- Articulate the significance of the asset.

7.15 At the core of this assessment is an understanding of the significance (value/importance) of a place. There have been numerous attempts to categorise the range of heritage values which contribute to an asset's significance. Historic England's 'Conservation Principles' sets out a grouping of values as follows, which inform this assessment:

7.16 Evidential value – *'derives from the potential of a place to yield evidence about past human activity…Physical remains of past human activity are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them…The ability to understand and interpret the evidence tends to be diminished in proportion to the extent of its removal or replacement*.' (Page 28)

7.17 Aesthetic Value – *'Aesthetic values can be the result of the conscious design of a place, including artistic endeavour. Equally, they can be the seemingly fortuitous outcome of the way in which a place has evolved and been used over time. Many places combine these two aspects… Aesthetic values tend to be specific to a time cultural context and appreciation of them is not culturally exclusive'*. (Pages 30-31)

7.18 Historic Value – '*derives from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative… Association with a notable family, person, event, or movement gives historical value a particular resonance... The historical value of places depends upon both sound identification and direct experience of fabric or landscape that has survived from the past, but is not as easily diminished by change or partial replacement as evidential value. The authenticity of a place indeed often lies in visible evidence of change as a result of people responding to changing circumstances. Historical values are harmed only to the extent that adaptation has obliterated or concealed them, although completeness does tend to strengthen illustrative value'*. (Pages 28-30)

7.19 Communal Value – "*Commemorative and symbolic values reflect the meanings of a place for those who draw part of their identity from it, or have emotional links to it… Social value is associated with places that people perceive as a source of identity, distinctiveness, social interaction and coherence. Some may be comparatively modest, acquiring communal significance through the passage of time as a result of a collective memory of stories linked to them…They may relate to an activity that is associated with the place, rather than with its physical fabric…Spiritual value is often associated with places sanctified by longstanding veneration or worship, or wild places with few obvious signs of modern life. Their value is generally dependent on the perceived survival of the historic fabric or character of the place, and can be extremely sensitive to modest changes to that character, particularly to the activities that happen there*". (Pages 31-32)

7.20 Value-based assessment should be flexible in its application. It is important not to oversimplify an assessment and to acknowledge when an asset has a multi-layered value base, which is likely to reinforce its significance.

7.21 In addition to the above values, the setting of a heritage asset can also be a fundamental contributor to its significance (value/importance) - although it should be noted that 'setting' itself is not a designation. The value of setting lies in its contribution to the significance (value/importance) of an asset. For example, there may be instances where setting does not contribute to the significance of an asset at all.

7.22 Historic England's Conservation Principles defines setting as "*an established concept that relates to the surroundings in which a place is experienced, its local context, embracing present and past relationships to the adjacent landscape*."

7.23 It goes on to state that "*context embraces any relationship between a place and other places. It can be, for example, cultural, intellectual, spatial or functional, so any one place can have a multi-layered context. The range of contextual relationships of a place will normally emerge from an understanding of its origins and evolution. Understanding context is particularly relevant*

to assessing whether a place has greater value for being part of a larger entity, or sharing characteristics with other places." (page 39)

7.24 In order to understand the role of setting and context to decision-making, it is important to have an understanding of the origins and evolution of an asset, to the extent that this understanding gives rise to significance in the present. Assessment of these values is not based solely on visual considerations but may lie in a deeper understanding of historic use, ownership, change or other cultural influence – all or any of which may have given rise to current circumstances and may hold a greater or lesser extent of significance.

7.25 The importance of setting depends entirely on the contribution it makes to the significance of the heritage asset or its appreciation. It is important to note that impacts that may arise to the setting of an asset do not, necessarily, result in direct or equivalent impacts to the significance (value/importance) of that asset(s).

7.26 It is evident that the significance (value/importance) of any heritage asset(s) requires clear assessment to provide a context for, and to determine the magnitude of impact of, development proposals. Impact on that value or significance is determined by first considering the sensitivity of the receptors identified which is best expressed by using a hierarchy of value levels.

7.27 There are a range of hierarchical systems for presenting the level of significance in use; however, the method chosen for this project is based on the established 'James Semple Kerr method' which has been adopted by Historic England, in combination with the impact assessment methodology for heritage assets within the Design Manual for Roads and Bridges (DMRB: HA208/13) published by the Highways Agency, Transport Scotland, the Welsh Assembly Government and the department for Regional Development Northern Ireland. This 'value hierarchy' has withstood scrutiny in the UK planning system, including Inquiries, and is the only hierarchy to be published by a government department.

7.28 The first stage of the approach is to carry out a thoroughly researched assessment of the significance (value/importance) of the heritage asset (**see Table 7.1**), in order to understand its value:

Table 7.1: Receptor Sensitivity

SIGNIFICANCE (VALUE/ IMPORTANCE) OF RECEPTOR	TYPICAL DESCRIPTION
Very High	World Heritage Sites, Listed Buildings, Scheduled Monuments and Conservation Areas of outstanding quality, or built assets of acknowledged exceptional or international importance, or assets which can contribute to international research objectives. Registered Parks & Gardens, historic landscapes and townscapes of international sensitivity.
High	World Heritage Sites, Listed Buildings, Scheduled Monuments, Conservation Areas and built assets of high quality, or assets which can contribute to international and national research objectives. Registered Parks & Gardens, historic landscapes and townscapes which are highly preserved with excellent coherence, integrity, time-depth, or other critical factor(s).

SIGNIFICANCE (VALUE/ IMPORTANCE) OF RECEPTOR	TYPICAL DESCRIPTION
Good	Listed Buildings, Scheduled Monuments, Conservation Areas and built assets (including locally listed buildings and non-designated assets) with a strong character and integrity which can be shown to have good qualities in their fabric or historical association, or assets which can contribute to national research objectives. Registered Parks & Gardens, historic landscapes and townscapes of good level of interest, quality and importance, or well preserved and exhibiting considerable coherence, integrity time-depth or other critical factor(s).
Medium/ Moderate	Listed Buildings, Scheduled Monuments, Conservation Areas and built assets (including locally listed buildings and non-designated assets) that can be shown to have moderate qualities in their fabric or historical association. Registered Parks & Gardens, historic landscapes and townscapes with reasonable coherence, integrity, time-depth or other critical factor(s).
Low	Listed Buildings, Scheduled Monuments and built assets (including locally listed buildings and non-designated assets) compromised by poor preservation integrity and/or low original level of quality of low survival of contextual associations but with potential to contribute to local research objectives. Registered Parks & Gardens, historic landscapes and townscapes with modest sensitivity or whose sensitivity is limited by poor preservation, historic integrity and/ or poor survival of contextual associations.
Negligible	Assets which are of such limited quality in their fabric or historical association that this is not appreciable. Historic landscapes and townscapes of limited sensitivity, historic integrity and/or limited survival of contextual associations.
Neutral/ None	Assets with no surviving cultural heritage interest. Buildings of no architectural or historical note. Landscapes and townscapes with no surviving legibility and/or contextual associations, or with no historic interest.

Magnitude of Impact

7.29 Once the significance (value/importance) of an asset has been assessed, the next stage is to determine the magnitude of impact (change) . **Table 7.2** sets out the levels of magnitude of impact (change). Some assets are more robust than others and have a greater capacity for change and therefore, even though substantial changes are proposed, their sensitivity to change or capacity to absorb change may still be assessed as low (remembering that according to Historic England The Setting of Heritage Assets – Planning Note 3, 'change' does not in itself imply harm, and can be neutral, positive or negative in effect).

Table 7.2: Impact Magnitude Criteria

MAGNITUDE OF IMPACT (CHANGE)	TYPICAL DESCRIPTION	
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction

Significance of Effects

7.30 The significance of an effect (Environmental Impact Assessment (EIA) 'significance') on the significance of a heritage asset (Heritage 'significance'), resulting from a direct or indirect physical impact, or an impact on its setting, is assessed by combining the magnitude of the change and the importance of the heritage asset. The matrix in **Table 7.3** below provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly where the importance or effect magnitude levels are not clear or are borderline between categories. EIA significance may be described on a continuous scale from negligible to major; it is also common practice to identify effects as significant or not significant, and in this sense major and moderate effects are regarded as significant in EIA terms, while minor effects are 'not significant'.

Table 7.3: Criteria for assessing the significance of effects on heritage assets

MAGNITUDE OF CHANGE	BASELINE SENSITIVITY: VERY HIGH	HIGH	MODERATE	LOW	VERY LOW
MAJOR BENEFICIAL	Major Beneficial	Major-Moderate Beneficial	Moderate Beneficial	Moderate-Minor Beneficial	Minor Beneficial
MODERATE BENEFICIAL	Major-Moderate Beneficial	Moderate Beneficial	Moderate-Minor Beneficial	Minor Beneficial	Minor-Negligible Beneficial
MINOR BENEFICIAL	Moderate Beneficial	Moderate-Minor Beneficial	Minor Beneficial	Minor-Negligible Beneficial	Negligible
NEGLIGIBLE BENEFICIAL	Minor Beneficial	Minor Beneficial	Negligible Beneficial	Negligible Beneficial	Neutral
NEUTRAL	Neutral	Neutral	Neutral	Neutral	Neutral
NEGLIGIBLE ADVERSE	Minor Adverse	Minor Adverse	Negligible Adverse	Negligible Adverse	Neutral
MINOR ADVERSE	Moderate Adverse	Moderate-Minor Adverse	Minor Adverse	Minor-Negligible Adverse	Negligible
MODERATE ADVERSE	Major-Moderate Adverse	Moderate Adverse	Moderate-Minor Adverse	Minor Adverse	Minor-Negligible adverse
MAJOR ADVERSE	Major Adverse	Major-Moderate Adverse	Moderate Adverse	Moderate-Minor Adverse	Minor Adverse

7.31 As a guide, effects determined to be Moderate or Major are considered to be significant. However, this is tested with professional judgement where other factors such as timescales and reversibility are taken into consideration, as well as wider considerations such as quality of the existing and proposed built environment and the particular characteristics of the asset in question

7.32 Simply combining value and magnitude of effect through a matrix may not, however, necessarily provide the appropriate category of significance of the effect. In particular, effects may have an impact on the physicality, appreciation and/or setting of the heritage asset, landscape character area, or the value of the existing view. Therefore, the matrix-driven judgements are supported by qualitative assessment text describing the effects, and a final professional judgement about their significance is drawn. This is necessary because this is not a strict quantitative process and some of these considerations will depend on expert judgements. Essentially, the strict application of the matrix can lead to adverse impacts, to some degree. That initial sift of impact, producing an adverse effect, requires qualitative assessment to ascertain whether effects arising from the matrix are genuinely negative.

Existing Baseline Conditions

7.33 The baseline for the study area has been informed by a comprehensive desk-based study, based on all readily available documentary sources including;

- A site visit;
- A review of cartographic and archival evidence for the Site and relevant assets;
- An examination of national, regional and local planning policies in relation to the built heritage and historic landscape;
- Archaeological and architectural records from the National Record of the Historic Environment, viewed through the Heritage Gateway website; and
- An assessment of the significance of the identified heritage assets.

7.34 An assessment of the potential impacts of the proposals on identified heritage assets has been undertaken. The Study Area defined for this assessment is the Site boundary and the outer area extending to 1km from it. Due to the nature of the Site, this is taken as the maximum extent of potentially significant effects on heritage as a result of changes in their settings. This does not exclude consideration given to views into the study area from outside this set area.

7.35 The assessment of baseline conditions is fundamental to the EIA process: environmental effects are measured by the degree of deviation from the baseline.

7.36 Details of the built heritage baseline have been established through proportionate desk-based research contained within a separate Initial Heritage Statement. This was produced at an early stage of an iterative process to be undertaken by the design team.

7.37 Information on assets affected by the Site has been gathered to understand the location and relationship of heritage assets to the Site.

7.38 There are no heritage assets within the Site. However, the following sensitive receptors have been identified as having the potential to be affected by the Proposed Development, forming the baseline for assessment. These are identified in **Table 7.4**.

Table 7.4: Identified Heritage Receptors which form part of the Baseline

NAME	REFERENCE	CATEGORY
Immediate Context		
Mill Road Conservation Area		Conservation Area
St Matthew's Church	1268345	Grade II
247 Newmarket Road	1300768	Grade II
Cambridge Gas Company War Memorial, Newmarket Road	1428632	Grade II
St Andrews the Less	1126143	Grade II
York Street Terraces (excluding nos. 86-92a even, 98-104 even and 101-111a odd)		Positive Unlisted Buildings
Ainsworth Street Terraces		Positive Unlisted Buildings
Stone Street Terraces		Positive Unlisted Buildings
Sleaford Street Terraces		Positive Unlisted Buildings
York Terraces		Positive Unlisted Buildings
33-38 Abbey Walk		Buildings of Local Interest
Sturton Street Terraces		Positive Unlisted Buildings

NAME	REFERENCE	CATEGORY
179 Sturton Street		Positive Unlisted Buildings
192-198 Sturton Street		Positive Unlisted Buildings
Milford Street Terraces		Positive Unlisted Buildings
Gwydir Street Terraces		Positive Unlisted Buildings
Edward Street Terraces		Positive Unlisted Buildings
Norfolk Street Terraces		Positive Unlisted Buildings
Norfolk Terrace		Positive Unlisted Buildings
Wider Context		
Central Conservation Area		Conservation Area
Riverside and Stourbridge Conservation Area		Conservation Area
Kite Conservation Area		Conservation Area
New Town and Glisson Road Conservation Area		Conservation Area
Castle and Victoria Road Conservation Area		Conservation Area
West Cambridge Conservation Area		Conservation Area
Jesus College	1125529	Grade I
St John's College	1332216	Grade I
University Library	1126281	Grade II
Church of Our Lady and the English Martyrs (Roman Catholic)	1349061	Grade I
Kings College Chapel	1139003	Grade I
All Saints Church	1126204	Grade I
St Andrews the Less	1126143	Grade II
Mill Road Cemetery	1001561	Grade II
Custodian's House, Mill Road Cemetery	1083564	Grade II
Church of Christ Church	1126147	Grade II
Old Cheddar's Lane pumping station	1006896	Scheduled Monument
Chapel of St Mary Magdalene, Stourbridge Chapel (The Leper Chapel)	1126144	Grade I

Assumptions and Limitations

7.39 Much of the information used by the baseline assessment consists of secondary information compiled from a variety of sources. Unless otherwise stated, the assumption is made that this information is reasonably accurate.

7.40 When considering visual effects on the context and setting of the identified heritage assets the most important, and worst case, views are considered in all instances. Views tested include those where the Proposed Development would have the most significant visual effect following an assessment of key views.

Evolution of the Baseline Conditions without Development

7.41 If the development was not undertaken, the benefits proposed will not be implemented and the Site will remain as a retail site.

7.42 Site attributes may also be affected by events taking place beyond the Site and the potential effects of climate change. Consequently, it is not possible to predict the impact of likely future events beyond the Site boundary with any degree of accuracy and so, for the purposes of this assessment, external factors are considered to have a **neutral effect** on significance.

Predicted Impacts

7.43 The scheme assessed is as shown in the parameter plans (**Appendix 4.1**) submission documents and drawings. This should also be read in conjunction with the Heritage Statement prepared by Bidwells (**Appendix 7.1**).

Construction

7.44 There is potential for construction activities to have an indirect impact on heritage assets in the surrounding area through noise, dust and movements of construction traffic which may have adverse effects on the setting of heritage assets. As the Site is currently in use as a retail park the adjacent assets already experience such activity from the existing road. As such, the potential for construction noise and other factors associated with the Proposed Development is therefore not considered to result in additional adverse effects, resulting in **neutral temporary effect**.

Operational Phase

7.45 The operational phase of the development is not considered to result in any additional direct physical impacts to the identified assets, beyond those resulting from the construction phase. The operational phase, however, has the potential to change the setting of heritage assets, impacting on assets surrounding the Site.

Heritage Assets within the study area

7.46 The preferred mitigation option is always to avoid or reduce impacts through design. The Proposed Development has sought to imbed mitigation on all the designated and non-designated assets in and around the Site through careful consideration of its design and appearance.

Conservation Areas

7.47 The Site is not located within a conservation area but is located within the immediate setting of the Mill Road Conservation Area as well as the wider setting of the Central, Riverside, Newtown and Glisson Road, Castle and Victoria and West Cambridge Conservation Areas. The Site as it stands is considered to make a minor adverse to a moderate/high adverse contribution to these settings.

7.48 The illustrative masterplan (**Appendix 4.1**) shows a total of 15 buildings on site with the Design Codes grouping these into differing character areas.

7.49 The Mill Road Conservation Area has an inward facing and enclosed nature due to the typology of the properties within it. As such, views of the Site are limited to breaks in the built form and from areas of open space. The proposed buildings which are in closest proximity to the Mill Road Conservation Area are noted as *conservation area buildings* in the Design and Access Statement and wider submission to ensure they are designed and treated in a way which respects the setting of the adjacent conservation area, and the assets it holds. The Design and Assess Statement and Design Code set out that the materials must refer to the tone and texture of the adjacent heritage buildings, create a more domestic character and the architectural treatment should aim to break down the mass of the building and create a lightweight feel to the upper levels.

7.50 A landscape and open space parameter plan has also been produced to show the green spaces within the Site. This shows that a landscape buffer along the south of the Site which provides a separation between the conservation area and proposed new buildings. The Design Code also sets out the positioning of the building plots ensuring this buffer will be in place moving forward.

7.51 As a result of the intervening built form of the properties within the Mill Road Conservation Area, the direct visual and physical relationship between the receptors are interrupted in a number of places, thereby reducing the extent of impact to this change in character. The south-western boundary of the Site has a more direct visual relationship. Here, the Proposed Development will replace the two large industrial units located on the south-western boundary of the Site with new buildings which will be of varying heights. The illustrative masterplan, landscaping scheme and Design Codes provide a strong basis for a development of high-quality nature, which steps down to the smaller scale of the conservation area, helping to mitigate the impact of the Proposed Development. The structures which are visible will be less visually contrasting than the existing retail sheds and will be set within an enhanced landscape context. Furthermore, the intervening pathway and trees which line the Site's boundary will help soften the built form in views and retain a visual and physical distinction between the two. The development also brings with it significant improvements to the close-range edge treatments alongside the heritage asset, and the Proposed Development is to be of a design quality and detailing such that its contribution also delivers beneficial impacts compared with the existing situation.

7.52 The impact arising from the introduction of larger scale buildings on the setting of Mill Road Conservation Area and the assets it holds is **minor adverse permanent** in effect. These impacts arise from the increased presence of urban built form at this scale from certain positions within the Mill Road Conservation Area.

7.53 In terms of the other identified conservation areas, impacts arise on these as a result of the long-range views into the Site.

7.54 The Proposed Development will result in an apparent reduction in open space above site in these longer views and will present a higher degree of awareness of built form in this location. The overall design intent of the proposed buildings, in particular the treatment of the positioning of buildings, materiality and flue zones as set out within the Design Codes seeks to minimise the effects of the increased height and to ensure that any views towards the Site are of buildings of the highest design quality. In addition, the material tones help to break up the massing in order to reduce the perceived visual impact.

7.55 Nonetheless, aspects of existing openness above the Site will be partially reduced as a result of the Proposed Development and this will likely have impacts ranging from **neutral** to **minor** to **moderate permanent adverse** effects on the setting of the identified conservation areas. Moderate effects occur to the Central Conservation Area with minor adverse effects on Riverside and West Cambridgeshire Conservation Areas. Neutral effects occur on the Kite, New Town and Glisson Road, Castle and Victoria Road Conservation Areas.

Listed Buildings

7.56 There are four listed buildings/structures within the immediate context of the Site, all Grade II, St Matthews Church, 247 Newmarket Road, Cambridge Gas Company War Memorial and Church of St Andrew the Less. All have a limited visual connection with the Site and therefore the Proposed Development will result in a **neutral permanent effect** on these assets.

7.57 There are a further nine listed buildings within the wider context of the Site, which are a mixture of Grade II, II* and I buildings/structures. There are a number of views around the city which form part of policy which have been considered as part of the Proposed Development. The policy viewpoints which have been looked at from a built heritage point of view are Castle Mound, Red Meadow Hill, Worts Causeway, Limekiln Road and Little Trees Hill. Due to the positioning of the view points and location of the listed buildings the Proposed Development has a **neutral permanent effect** on the assets seen within the Worts Causeway, Limekiln Road and Little Trees Hill views.

7.58 The assets which are seen in the remaining views – Castle Mound and Red Meadow Hill – are, in the north-west, Jesus College (GI), All Saints Church (GI) and Christ Church (GII) and from the west, University Library (GII) Kings College Chapel (GI), St Johns College (GI) and The Church of Our Lady (GI) – views of the Site in the context of All Saints and Jesus College are also possible from this location. Chapel of St Mary Magdalene Stourbridge Chapel (Grade I) and the Custodian's House are not prominent/visible from these viewpoints due to their smaller scale nature.

7.59 With the exception of Christ Church, the Proposed Development does not sit directly behind the assets in these viewpoints. However, it does rise above the established roofline of the Site. As such, although there is more awareness of the Site, the prominence of the identified listed buildings is maintained. The proposals will result in an apparent reduction in open space above the Site. However, the overall design intent of the proposed buildings, in particular the treatment of the positioning of buildings, height, tones and flue zones as set out within the Design Codes seeks to minimise the effects of the increased height and to ensure that any views towards the Site are of buildings of the highest design quality. In addition, the material tones help to break up the massing in order to reduce the perceived visual impact.

7.60 Nonetheless, aspects of existing openness above the Site will be partially reduced as a result of the Proposed Development and this will likely have a **moderate adverse permanent adverse** impact on the setting of a Jesus College Chapel and Christ Church, a moderate-minor adverse impact on All Saints Church and a **minor adverse permanent adverse** effect on St John's College, University Library, Church of Our Lady and the English Martyr and King's College. There will be a **negligible adverse permanent** effect on the Custodian's House and a neutral permanent effect on the Chapel of St Mary Magdalene.

Registered Park and Garden

7.61 The Mill Road Cemetery is screened from the Proposed Development by its existing trees to a large degree, although some views through breaks in this vegetation are possible. Where this occurs, the Proposed Development will be visible and will present a higher degree of awareness of built form within the wider setting of the cemetery. In line with the design mitigation set out within the Design Code and through the parameter plans, impacts are sought to be mitigated and as such, it is considered that the Proposed Development will result in a **minor adverse permanent** effect on the setting of the Grade II listed cemetery.

Scheduled Monument

7.62 The Old Cheddar's Lane pumping station is seen within the context of the Site from a number of the policy viewpoints discussed within the listed building section. Due to its age and function, although prominent in the skyline of the city, it has always been seen within the context of an evolving and working city. As such, although the Proposed Development will be seen in the context, the additional massing is considered to have a **minor adverse permanent adverse** effect on the monument.

Non-designated Assets

7.63 There are a number of non-designated assets within the Mill Road Conservation Area which have a visual connection with the Site. As a result of their lower level of value, the increased awareness of the Site through additional massing is considered to have **minor adverse permanent adverse** effects on the setting of the York Street Terraces and Ainsworth Terraces; **negligible adverse** effects on Stone Street Terraces, Sleaford Street Terraces, York Terraces and a **neutral permanent effect** on the remainder of identified non-designated assets. As with the Mill Road Conservation Area itself the development also brings with it significant improvements to the close-range edge treatments alongside the heritage asset, and the scheme is to be of a design quality and detailing such that its contribution also delivers beneficial impacts compared with the existing situation.

Mitigation

7.64 There are no additional mitigations to the Proposed Development, in terms of built heritage, other than the embedded design mitigation discussed above.

Residual Effects

7.65 Given the mitigation is embedded into the design, impacts have already been reduced where possible. Therefore, residual effects will therefore remain as predicted.

Monitoring

7.66 There is no requirement for monitoring of the built heritage assets during the construction or operational phases.

Summary of Impacts

7.67 The assessment has considered the potential effects of construction and operation on heritage assets within the Site and within a 1km Study Area.

7.68 It has found that there is potential for operational phase effects on the setting off the heritage assets within the surrounding area.

7.69 None of the overall effects are considered to be of more than moderate adverse significance in the long term. There are also considered to be some beneficial operational phase effects on the asset.

7.70 A summayr of impacts can be found in **Table 7.5**.

Table 7.5: Summary of Impacts: *Cultural Heritage*

ASSET	DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Mill Road Conservation Area	Visual impact of built form upon the setting	Reg/ Dist	Mod	Min	Adv	Irrev	LT	Min	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	Ben.	Irrev	LT	Min
St Matthew's Church	Visual impact of built form upon the setting	Nat	Mod	None	-	-	-	Neu	N/A	None	-	-	Neu
247 Newmarket Road	Visual impact of built form upon the setting	Nat	Mod	None	-	-	-	Neu	N/A	None	-	-	Neu
Cambridge Gas Company War Memorial, Newmarket Road	Visual impact of built form upon the setting	Nat	Mod	None	-	-	-	Neu	N/A	None	-	-	Neu

ASSET	DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
St Andrews the Less	Visual impact of built form upon the setting	Nat	Mod	None				Neu	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.				Neu
York Street Terraces (excluding nos. 86-92a even, 98-104 even and 101-111a odd)	Visual impact of built form upon the setting	Loc	Low	Mod	Adv	Irrev	LT	Min	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	Adv	Irrev	LT	Min
Ainsworth Street Terraces	Visual impact of built form upon the setting	Loc	Low	Mod	Adv	Irrev	LT	Min	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	Adv	Irrev	LT	Min

ASSET	DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Stone Street Terraces	Visual impact of built form upon the setting	Loc	Low	Neg	Adv	Irrev	LT	Neg	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	Adv	Irrev	LT	Neg
Sleaford Street Terraces	Visual impact of built form upon the setting	Loc	Low	Neg	Adv	Irrev	LT	Neg	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	Adv	Irrev	LT	Neg
York Terraces	Visual impact of built form upon the setting	Loc	Low	Neg	Adv	Irrev	LT	Neg	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	Adv	Irrev	LT	Neg

ASSET	DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
33-38 Abbey Walk	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu
Sturton Street Terraces	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu
179 Sturton Street	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu

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192-198 Sturton Street	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu
Milford Street Terraces	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu
Gwydir Street Terraces	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu

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					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
Edward Street Terraces	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu
Norfolk Street Terraces	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu
Norfolk Terrace	Visual impact of built form upon the setting	Loc	Low	None	-	-	-	Neu	Embedded design mitigation - Removal of poor-quality structures on site, replacement with high quality design structures, enhancement of landscape and public realm, creation of a clear and active frontage to site ensuring a better integration with the streetscape.	-	-	-	Neu

ASSET	DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
Central Conservation Area	Visual impact of built form upon the setting	Reg/ Dist	High	Mod	Adv	Irrev	LT	Mod	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Mod
Riverside and Stourbridge Conservation Area	Visual impact of built form upon the setting	Reg/ Dist	Mod	Neu	Adv	Irrev	LT	Neu	N/A	Adv	Irrev	LT	Neu
Kite Conservation Area	Visual impact of built form upon the setting	Reg/ Dist	Mod	None	-	-	-	Neu	N/A	-	-	-	Neu
New Town and Glisson Road Conservation Area	Visual impact of built form upon the setting	Reg/ Dist	Mod	None	-	-	-	Neu	N/A	-	-	-	Neu
Castle and Victoria Road Conservation Area	Visual impact of built form upon the setting	Reg/ Dist	Mod	None	-	-	-	Neu	N/A	-	-	-	Neu

ASSET	DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
West Cambridge Conservation Area	Visual impact of built form upon the setting	Reg/ Dist	Mod	Neu	Adv	Irrev	LT	Neu	N/A	Adv	Irrev	LT	Neu
Jesus College	Visual impact of built form upon the setting	Int	Very High	Min	Adv	Irrev	LT	Mod	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Mod
St John's College	Visual impact of built form upon the setting	Int	Very High	Neg	Adv	Irrev	LT	Min	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Min
University Library	Visual impact of built form upon the setting	Nat	Mod	Neg	Adv	Irrev	LT	Min	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Min

ASSET	DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
Church of Our Lady and the English Martyrs (Roman Catholic)	Visual impact of built form upon the setting	Int	Very High	Neg	Adv	Irrev	LT	Min	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Min
Kings College Chapel	Visual impact of built form upon the setting	Int	Very High	Neg	Adv	Irrev	LT	Min	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Min
All Saints Church	Visual impact of built form upon the setting	Int	High	Min	Adv	Irrev	LT	Min	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Min
Mill Road Cemetery	Visual impact of built form upon the setting	Nat	Mod	Min	Adv	Irrev	LT	Min	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Min

ASSET	DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
					ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
Custodian's House, Mill Road Cemetery	Visual impact of built form upon the setting	Nat	Mod	Neg	Adv	Irrev	LT	Neg	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Neg
Church of Christ Church	Visual impact of built form upon the setting	Nat	Mod	Mod	Adv	Irrev	LT	Mod	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Mod
Old Cheddar's Lane pumping station	Visual impact of built form upon the setting	Nat	Mod	Min	Adv	Irrev	LT	Min	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	Adv	Irrev	LT	Min
Chapel of St Mary Magdalene, Stourbridge Chapel (The Leper Chapel)	Visual impact of built form upon the setting	Int	Very High	None	-	-	-	Neu	Embedded design mitigation – High quality design as including the positioning of buildings, height parameters, tones of buildings and flue zones as set out within the Design Codes.	-	-	-	Neu

Key:

Loc: Local	Int: International	Dist: District	Mod: Moderate	Neg: Negligible	LT: Long-Term
Nat: National	Reg: Regional	Min: Minor	Neu: Neutral	Irrev: Irreversible	Adv: Adverse

Flood Risk, Drainage and Water Resources

8.0 Flood Risk, Drainage and Water Resources

Introduction

8.1 This chapter addresses the flood risk, drainage and water resources impacts of the Proposed Development. It has been prepared by Waterman Infrastructure and Environment Ltd ("Waterman") to assess the impacts of the Proposed Development in relation to the effects it would have on flood risk both on-site and elsewhere, local hydrology and water resources, during construction and once the development is complete and operational.

8.2 Where significant adverse impacts are identified, appropriate mitigation measures to avoid, reduce or offset these impacts are detailed in this chapter. The likely residual impacts of the Proposed Development accounting for these mitigation measures are also provided.

8.3 This chapter is supported by the following appendices provided in Volume 2 of the ES:

- **Appendix 8.1** : Flood Risk Assessment & Surface Water Drainage Strategy.

Potential Impacts

8.4 This chapter assesses the following potentially significant environmental impacts and environment effects arising from the Proposed Development with respect to flood risk, drainage and water resources.

Construction

- Temporary generation and mobilisation of contaminants and pollutants arising from the construction works leading to potential impacts upon water quality within the underlying groundwater and nearby sensitive surface water receptors;
- Temporary on-site and off-site flood risk impacts as a result of uncontrolled discharge of runoff generated during construction works / activities;
- Adverse impacts upon local water features from on-site abstraction of groundwater;
- Adverse impacts upon waterbodies and chalk streams at unspecified locations due to temporary increased third party abstraction from strategic groundwater resources to supply increased potable (mains) water demand.

Operational Development

- Increased flood risk to on-site and off-site areas from uncontrolled discharge of runoff from the Proposed Development;
- Generation and mobilisation of contaminants and pollutants leading to potential impacts upon water quality within the underlying groundwater and nearby sensitive surface water receptors;
- Increased foul flows from the Proposed Development potentially leading to increased risk to off-site areas from foul sewer flooding;
- Adverse impacts upon local water features from on-site abstraction of groundwater;
- Adverse impacts upon waterbodies and chalk streams at unspecified locations due to increased third party abstraction from strategic groundwater resources to supply increased potable (mains) water demand for the Proposed Development.

Methodology

Legislation and Policy Context

8.5 Potential impacts and effects have been assessed taking into consideration the following legislative and policy framework:

- National Planning Policy Framework (NPPF) ;
- National Planning Practice Guidance (PPG);
- Cambridge Local Plan 2018 Policy 31 : Integrated Water Management; and
- Cambridge Local Plan 2018 Policy 32 : Flood Risk.

Planning Guidance and Technical Guidance (Flood Risk and Drainage)

8.6 Potential impacts and effects in relation to flood risk, drainage and water quality have been assessed taking into consideration the following technical guidance and strategic studies:

- Non-statutory Technical Standards for Sustainable Drainage Systems (SuDS);
- Cambridgeshire County Council Surface Water Planning Guidance;
- Sustainable Development, Climate Change, Water and Flooding;
- Sustainable Drainage : Cambridge Design and Adoption Guidance;
- Cambridgeshire Flood and Water Supplementary Planning Document (SPD) and Sustainable Design & Construction SPD;
- Greater Cambridge Strategic Flood Risk Assessment Level 1; and
- Cambridge Preliminary Flood Risk Assessment.

Technical References and Strategic Plans (Water Resources)

Cambridge Water: Water Resources Management Plan (WRMP) 2019

8.7 WRMP sets out the long-term plan for the 25 years between 2020 and 2045 for meeting the demand for water in the Cambridge region. It considers climate change, population growth and the need to protect the environment. The WRMP is a legal document submitted to Defra; both Natural England and the EA are stakeholders.

8.8 Strategic Environmental Assessment (SEA) sits alongside which considers whether the proposals within the WRMP could cause “significant environmental effects” and to assess the potential impacts of the strategic water supply options being considered.

Cambridge Water: Draft Water Resources Management Plan 2024

8.9 Currently in draft form, WRMP24 sets out the long-term plan for the 25 years between 2025 and 2050 for meeting the demand for water in the Cambridge region. This Plan is also subject to SEA.

8.10 There has been a significant reduction in the assessed dry year annual average deployable output of Cambridge Water sources since WRMP19, once sustainability reductions are applied to abstraction licences. Declared baseline licence and deployable output shows a modest increase, due to WRMP19 supply options to address growth and resilience.

8.11 Sustainability reductions to deployable output to seek to achieve WFD ‘No deterioration’ are included within the WRMP 24 as reductions in borehole abstraction. The need to address the

risk of causing deterioration to the environment is driving an immediate deficit in the baseline supply demand balance even within existing authorised abstraction licence limits.

Water Resources East

8.12 WRE is a pioneering multi-sector water resource planning initiative. Using the first application of shared vision planning and robust decision making in the UK, it is creating a more integrated approach to long-term water resource management and planning, looking ahead to 2080.

Assessment Methodology

8.13 Baseline data relating to the Site and its surroundings have been compiled using the following sources:

- Site walkover to understand the existing hydrological regime and proximity to watercourses;
- Utilities survey data and public sewer records to establish the baseline drainage regime;
- Topographical survey data;
- Review of online Environment Agency (EA) data, British Geological Survey (BGS) mapping and Flood Estimation Handbook (FEH) hydrological data;
- Review of Cambridge and South Cambridgeshire Strategic Flood Risk Assessment (SFRA) data and mapping; and
- Consultation with Cambridgeshire County Council in their role as Lead Local Flood Authority (LLFA), and Anglian Water.

Flood Risk Assessment

8.14 A desk-based Flood Risk Assessment (FRA) & Surface Water Drainage Strategy (SWDS) (**Appendix 8.1**) has been undertaken by Waterman broadly in line with BS8533, the recognised industry Code of Practice.

8.15 The assessment of flood risk and management of surface water runoff incorporates the following elements:

- A review of relevant baseline conditions from published mapping, data sources, and walkover surveys;
- Consideration of potential effects upon the local hydrogeological and hydrological receptors;
- Detailed assessment of flood risk from all potential sources;
- Development of a surface water drainage strategy that incorporates sustainable drainage (SuDS) measures and pollutant treatment trains, integrated within the on-site landscape and green infrastructure;
- Demonstration that the proposed drainage strategy follows the drainage hierarchy, with surface water runoff restricted to as close to the greenfield runoff rate as reasonably practicable and/or infiltration into the ground;
- Consideration and future-proofing of climate change effects; and
- Consideration of the existing and proposed foul flows from the Site and pre-planning dialogue with Anglian Water to seek to determine the capacity in the existing public sewer network and its ability to receive additional flows from the Proposed Development, such that network reinforcement can be planned as early as possible, where required.

8.16 Flood risk and surface water management are qualitatively and quantitatively assessed within the FRA & SWDS based on the maximum parameters for the outline proposals for the Proposed Development at the complete and operational stage. Generic and qualitative assessment of the construction phase has been carried out based upon professional experience and professional judgement.

Water Resources and Potable Water Demand

8.17 Principles for potable water demand have been steered by current Building Regulations benchmark criterion, local planning policies and BREEAM Wat01 target credits. Measures targeted to achieve benchmark criteria for potable water demand are presented and discussed further within the Sustainability Strategy submitted alongside the planning application.

8.18 A qualitative assessment of potential impacts has been undertaken as third party strategic measures outside of the Applicant's direct influence and control are potentially required to supply potable water to the Proposed Development that would inherently be required to negate potential local impacts upon the environment and water resources.

Assumptions and Limitations

8.19 General assumptions and limitations which apply to all technical chapters are set out in Chapter 2: EIA Methodology.

8.20 Impacts and effects upon the underlying geology and hydrogeology, and potential for mobilisation of contaminants beneath the Site, are covered within Chapter 9: Ground Conditions and Contamination.

8.21 There are no published criteria for assessing the significant potential impacts in relation to flood risk and the water environment. Significance criteria have therefore been developed using flood risk assessment guidance, professional experience and engineering judgement.

8.22 The timescale relating to the length of time that the impacts prevail has been defined as follows:

- Temporary (e.g. construction phase);
- Short Term (e.g. less than 5 years);
- Medium Term (e.g. 5-10 years); and
- Long Term (e.g. for the duration of the operational phase of the development).

Significance Criteria

8.23 An assessment has been made in relation to the relative significance of the likely environmental effects identified.

8.24 Specific criteria have been developed, giving due regard to the following, as relevant:

- Sensitivity of the receptor;
- Nature of the effect (direct or indirect, reversible or irreversible);
- Extent and magnitude of the effect;
- Duration of the effect (short, medium or long-term);
- Permanence of the effect (temporary or permanent); and

- Whether the effect occurs in isolation or is cumulative.

8.25 Identified effects can be one of the following:

- **Not significant**: No significant effect to an environmental resource or receptor;
- **Significant beneficial**: Advantageous or positive effect to an environmental resource or receptor; and
- **Significant adverse**: Detrimental or negative effect to an environmental resource or receptor.

8.26 Whilst there is no recognised definition of what constitutes a 'significant' effect, it is good practice to identify the degree of significance or importance. It is therefore proposed that significant effects will generally be described as follows, unless best practice guidance for specific topics requires the use of different descriptors:

- Minor significance:
  - Minor local scale increase or decrease in flood risk;
  - Temporary local scale increase or decrease in demand on surface and/or foul water infrastructure; and or
  - Temporary local scale increase or decrease in demand for potable water supply and a temporary increase or decrease in capacity of existing infrastructure directly or indirectly leading to minor effects to associated sensitive environmental receptors.
- Moderate significance:
  - Moderate local scale or minor regional scale increase or decrease in flood risk;
  - Minor permanent increase or decrease in demand on surface and/or foul water infrastructure; and or
  - Permanent local scale increase or decrease in demand for potable water supply and a permanent increase or decrease in capacity of existing infrastructure directly or indirectly leading to moderate effects and moderate harm to associated sensitive environmental receptors.
- Major significance:
  - Significant local scale or moderate to significant regional scale increase or decrease in flood risk;
  - Major permanent increase or decrease in demand on surface water and/or foul water infrastructure; and or
  - Permanent regional scale increase or decrease in demand for potable water supply and a permanent increase or decrease in capacity of existing infrastructure directly or indirectly leading to major effects and significant harm to associated sensitive environmental receptors.

Existing Baseline Conditions

Flood Risk

8.27 Published mapping indicates that the Site lies at low risk of flooding from Main Rivers (including the River Cam and its tributaries) and the sea. Furthermore, the Site is not traversed by ordinary watercourses.

8.28 The Site does not benefit from, nor rely upon, the presence of formal fluvial flood defences.

8.29 The majority of the Site is deemed to remain dry or be subject to very shallow (less than 150mm) of surface water flooding from intense or prolonged rainfall even for a significant (between 1 in 100 year up to 1 in 1,000 year) event. However, localised areas around the south eastern and north eastern periphery of the Site are shown to be subject to ponding during moderate events and generally align with local topographical low spots and hollows, and lowered access routes between units to service yards.

8.30 Based upon velocity mapping there are potential localised pathways for excess surface water runoff to progress overland from off-site areas towards the north eastern and south western fringes of the Site.

8.31 Some offsite areas downgradient from the Site are understood to be at an elevated risk of surface water flooding, including the Coldham's Common 'wetspot' as designated by the LLFA.

8.32 Flood risk to the Site from other sources of flooding, such as groundwater, sewers, failure of pumping installations, or breach of raised reservoir embankments is considered to be low.

Hydrology & Surface Water Management

8.33 The Site falls within the natural surface water drainage catchment of the River Cam.

8.34 The majority of the existing Site comprises impermeable surfacing and hardstanding which is drained via linear channel drains and gullies, via private sewer networks to the public surface water sewer network. Surface water runoff from building roof areas is also drained via private sewer networks to the public surface water sewer network.

8.35 A significant portion of the central and southern areas of the Site are drained, via gravity, to an underground box culvert attenuation storage arrangement beneath the southern car park. Flows are released in a north easterly direction, via a flow control arrangement, ultimately draining to the public surface water sewer network beneath Coldham's Lane.

8.36 Remaining areas of the Site, including sections of existing highway, drain via multiple public surface water outfalls that abut the Site.

Wastewater Management

8.37 Foul flows from the existing retail and commercial facilities on the Site are drained to the public foul sewer networks beneath public highways that encircle the Site, ultimately discharging to Cambridge Water Recycling Centre.

Geology & Hydrogeology

8.38 Geological and hydrogeological conditions at the Site as informed by the ground investigation works are detailed in Table 15.1 within **Appendix 9.1**. In summary, ground conditions beneath the Site comprise Made Ground, underlain by the West Melbury Chalk Formation (Principal Aquifer) and Gault Clay Formation.

8.39 Surface water abstractions are not recorded on-site or in the surrounding area. The Site is not located within a Groundwater Source Protection Zone.

Potable Water Supply

8.40 Existing retail and commercial facilities on the Site are served by potable water supply networks managed by Cambridge Water; an 8" (200mm) distribution main beneath Coldham's Lane to

the north, and a 6" (150mm) distribution main beneath York Street to the south west. Average baseline potable water demand has been estimated to be 33,230 litres/day based upon a review of meter records.

8.41 Cambridge Water pre-development enquiry feedback sets out that there is available capacity within the local potable water supply mains network to serve the Proposed Development, both for construction and the completed and operational development (an estimated total demand of 188,130 litres/day).

8.42 Capacity is confirmed as being available within existing water mains beneath Coldham's Lane and York Street.

8.43 Water resources are supplied from groundwater sources – 97% from chalk aquifers and the remaining 3% available from greensand aquifers. The underground chalk strata is generally a robust water storage aquifer, which is recharged mostly by rainfall during the winter months each year. Cambridge Water take water from this aquifer using boreholes sunk into the ground, at 26 sites across the region.

8.44 Drinking water is provided to customers by 36 service reservoirs and water towers. All water sources are linked by a highly-connected, integrated and flexible supply system. In a situation where there is a water shortage, for example, water can be transferred between service reservoirs across the region to maintain supplies to all customers.

Evolution of the Baseline Conditions without Development

8.45 In accordance with the EIA Regulations, consideration of the likely evolution of baseline conditions if the Proposed Development were not to come forward is required.

Flood Risk

8.46 Based upon the Site being at low risk of flooding and remote from waterbodies, baseline conditions are not expected to materially evolve without development. Climate change effects are not expected to materially affect flood risk to the baseline Site from fluvial or surface water sources.

Drainage

8.47 Based upon the extensive impermeable area coverage that would be expected to remain in situ, baseline conditions are not expected to materially evolve without development. Climate change effects of increased rainfall upon the baseline Site are not expected to materially affect flood risk elsewhere as off-site runoff would tend to be regulated by the capacity of the baseline drainage arrangements.

8.48 Foul water flows for the baseline Site itself would not be expected to materially change without development.

Water Resources

8.49 Cambridge Water accept that they face a number of significant challenges over the 25 years covered by their draft WRMP 24. These include:

- Increased demand for water because of significant population growth and an increase in the number of properties in the Cambridge region.
- Needing to change the way resources are used because some of the water abstracted from the aquifer could lead to a deterioration of that environment.

8.50 Cambridge Water also take the impact of climate change – and the possibility of more periods of prolonged drought, for example, into account when considering the volume of water they have available to meet demand. Their assessment of the impact of climate change is that this will reduce the water they have by 0.8 million litres per day (Ml/d) by 2045.

8.51 WRMP 24 baseline supply/demand balance information for the critical period planning scenario indicates that target headroom is breached in 2029/30, and a deficit is shown in 2040.

8.52 Cambridge Water have been investigating the impact of their abstractions on the environment to determine licence reductions (to reduce the quantum of abstraction at sensitive locations). The approach to determining reductions has developed since sustainability changes for no deterioration were considered for WRMP19, and this has significantly increased the number of licence reductions required.

8.53 Combining outputs from previous WRMPs for water companies in the east of England indicates that as a whole, supply/demand deficits could be widespread across the region beyond the 2030s as a result of future pressures on water use and availability because of impacts from climate change and growth.

8.54 In summary, water stress within the Cambridge area is anticipated without the Proposed Development or projected growth in Cambridge even though potable water demand for the baseline Site itself would not be expected to materially change if it were to remain as per the baseline land uses

Receptor Sensitivity

8.55 There are no published criteria for assessing the significant potential impacts associated with flood risk, drainage and water resources. Significance criteria have therefore been developed using guidance and professional judgement.

8.56 The significance of the effect depends on the value of the resource, the sensitivity of the receptor and the ways in which the Proposed Development can provide a pathway to the receptor. The significance of an effect is also informed by the timescales involved and extent of the affected area.

8.57 The assessment of the relative significance and likely significant residual effects has been based on the receptor sensitivity and resource sensitivity matrices detailed in **Tables 8.1**, and **8.2**, and the significance criteria set out in **Table 8.3**. Other risks to groundwater quality and groundwater chemistry due to other aspects of the Proposed Development are assessed in **Chapter 9**.

Table 8.1: Receptor Sensitivity

GEOGRAPHIC IMPORTANCE	VALUE	CRITERIA
International / National	Very high	Extremely rare (endangered), potentially extremely vulnerable to change, of international importance or recognition, very limited potential for substitution. For example, World Heritage Site, Ramsar Wetland etc.