CAMBRIDGE EAST

Contaminated Land RAG Assessment

December 2020

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Cambridge East

Contaminated Land RAG Assessment

November 2020

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Mott MacDonald is not insured for, and therefore will not undertake surveys to identify asbestos or provide any guidance on the treatment of asbestos, or similarly for toxic mould. Should the presence of asbestos or toxic mould be suspected during the course of the study, Mott MacDonald would recommend the appointment of a specialist contractor to address the issue and would not provide advice on risk or remedial measures.

Contents

Tables

Executive Summary

Marshall Group Properties are proposing to put forward the site of Cambridge Airport, and potentially an area of greenbelt that lies to its east (herein referred to as the Site), for allocation for development in the emerging Greater Cambridge Local Plan. Proposed future uses for the site include residential, commercial, sports and potentially a transport hub. Mott MacDonald has been commissioned to complete an assessment to determine whether the Site could support the uses proposed, in terms of risks from contaminated land.

The overall objective of this report is to assess the potential contamination risks across the site using existing information and historical mapping. This will be used to inform a RAG (Red, Amber, Green) assessment of contamination risks.

The RAG assessment split the site into six areas (Plots A to F) dependant on land use. The overall RAG assessments for each Plot have been summarised in Appendix A (A.6) and in the table below. The assessment has concluded that, whilst hotspots of contamination are likely within Plots A and B, the majority of the Site can be classified as 'green', lower risk, in terms of land contamination. The lower risk areas are not anticipated to pose a risk to future development.

Summary of risk areas in terms of total site area

Plot	Area (ha)	Area designated 'Red'		Area designated 'Amber'		Area designated 'Green'	
		(ha)	% plot area	(ha)	% plot area	(ha)	% plot area
A	472.4	14.8	3.1%	67.9	14.4%	389.7	82.5%
B	18.8	0.0	0%	18.8	100%	0.0	0%
C	12.9	0.0	0%	0.0	0%	12.9	100%
D	39.4	0.0	0%	0.0	0%	39.4	100%
E	15.1	0.0	0%	0.0	0%	15.1	100%
F	289.5	0.0	0%	0.0	0%	289.5	100%
Total in safeguarded plots (A, B and C)	504.1	14.8	2.9%	86.7	17.2%	402.6	79.9%
Total in green belt plots (D, E and F)	344.0	0.0	0%	0.0	0%	344.0	100%

The types of contaminants that are likely to be encountered in the amber and red areas comprise hydrocarbons from fuel storage, solvents from aircraft maintenance and metals from paints. These are all common contaminants associated with airfields and general industry, and remediation methods are well known and proven for these contaminants. The examples within Section 5 of this report summarise likely contaminants and remediation or mitigation measures that have enabled development on similar sites in terms of land use and environmental setting. This confirms that, if encountered, the risks can be effectively mitigated to support development in all areas of the site.

In conclusion, there are no known contaminants that have been uncovered from this review that would prevent the site being developed.

1 Introduction

1.1 Background

Marshall Group Properties are proposing to put forward the site of Cambridge Airport, and potentially an area of greenbelt that lies to its east (herein referred to as the Site), for allocation for development in the emerging Greater Cambridge Local Plan. Proposed future uses for the site include residential, commercial, sports and potentially a transport hub. Mott MacDonald has been commissioned to complete an assessment to determine whether the Site could support the uses proposed, in terms of risks from contaminated land.

1.2 Objectives

The overall objective of this report is to assess the potential contamination risks across the site using existing information and historical mapping. This will be used to inform a RAG (Red, Amber, Green) assessment of contamination risks.

1.3 Scope of Work

The scope of work includes:

- Determine RAG parameters in terms of risk from contaminated land;
- Review existing data and historical maps from the Site;
- Determine potential sources of contamination based on the information above to assess risks from contaminated land within a RAG assessment;
- Provide conclusions and recommendations for future development.

1.4 Sources of information

Information has been gathered from the following sources:

- Landmark (2013) Envirocheck Report for Project Wing East. Project Number: 44455980_1_1.
- Landmark (2013) Envirocheck Report for Project Wing West. Project Number: 44455892_1_1.
- Landmark (2020) Historical Mapping for Cambridge East (airport). Order Number: 256713501_1_1.
- Landmark (2020) Historical Mapping for Cambridge East (greenfield). Order Number: 256715370_1_1.
- Mott MacDonald (1999) Blue Circle Site, Coldham's Lane: Review of Health, Safety and Environmental Hazards.
- Mott MacDonald (2003) Cambridge Airport Redevelopment Initial Environmental Site Assessment.
- Mott Macdonald (2014) Petrol Station Storage - Remediation Statement.
- Mott MacDonald (2015) Jaguar Land Rover – Phase I Desk Study and Phase II Geoenvironmental Interpretive Report.
- Mott Macdonald (2018) Marshall Aircraft Design Office (ADO) building- Generic Quantitative Risk Assessment.

- Peter Brett Associates (2019) Additional Phase 2 Ground Conditions and Land Contamination Assessment. Document Reference: 37305/3508/R1/rev1.
- Mott MacDonald (2019) Project Wing Development: Remediation Strategy. Document Reference: 400182/01/C.
- Information provided during discussions with Marshall.

2 Site Details

2.1 Site Description and Topography

The site comprises Cambridge Airport (Plot A) and an area of mostly greenbelt that lies to its east (Plots B-F). A site location plan can be seen in Figure A.1 (Appendix A).

Cambridge Airport comprises a runway running southwest to north east with various hangers and associated buildings in the north west of the site ("South Works"). The site is bounded to the north by Newmarket Road (A1303) and to the west by residential buildings and the A1134. Agricultural fields and the residential buildings of Cherry Hinton lie to the south, with the east bounded by Airport Way (road). The South Works comprise a number of large aircraft hangers where several industrial activities take place. These include aircraft re-spraying, aircraft maintenance, servicing and conversion. The airport terminal and fire station are also located within the South Works area. A Fire Training Ground (FTG) is located to the south of Plot A.

The sites to the east are largely comprised of agricultural fields, with the exception of the most westerly, Plot B, which comprises Newmarket Road Park & Ride. To the north, east and south lie agricultural fields, with the airport and residential houses to the west. Newmarket Road (A1303) divides the northern and southern plots.

The entire site is relatively flat, lying at approximately 10m Above Ordnance Datum (AOD).

2.2 Site History

The history of this area has been summarised from the available 1:10,560, 1:10,000,1:2:500, and 1:1:500 land use mapping provided (from 1886 - 2020), provided by Landmark (2013 & 2020). The latest historical map available for the site and the surrounding area (1km buffer zone of centre point) is dated 2020. Google Earth Pro (2020) provides aerial views of the site and surrounding area dated between 1945 and 2018. Potential contaminative site uses have been highlighted within Figure A.2 (Appendix A).

The site history has been split across two areas: the airport and the other, predominantly greenfield sites to the east.

Table 2-1: Cambridge Airport - Site History

Dates (map scale)	On-site	Off-site
1886 – 1888 (1:10,000)	Predominantly agricultural land with farm buildings and some residential properties surrounding.	Coprolite works at the south western boundary. Slurry pit 250m west. Railway line 500m south.
1903 (1:2,500)	No significant changes.	Cement and lime works located on south western boundary and 200m south west. Rifle range located on Coldham's Common.
1927 (1:2,500)	No significant changes.	Several marl pits are present south of the site, within 50m. A concrete works is present
1948 (1:10,560-aerial photography)	Cambridge Airport is present on map with the addition of unnamed buildings in the north west.	"Works" present north of site (in location of current Marshall North Works).
1960 (1:10,000)	Airport is noted as "Cambridge (Teversham) Aerodrome".	No significant changes.

Dates (map scale)	On-site	Off-site
1969 – 1972 (1:2,500)	Runway is present at Cambridge Airport. Coach buildings works present on north western part of site. Hangar present on north part of site. Tanks present on north part of site, beside the customs building. These are part of the “South Works”.	Chalk pit present 380m south.
1973 (1:10,000)	Additional tanks present in north.	Works, including abattoir, slaughter house, depot and warehouse present 300m south. Expansion of Chalk pit 380m south.
1985 (1:10,000)	Expansion of buildings on northern part of site.	Chalk pit located 430m south.
1992 (1:10,000)	No significant changes.	Garage located 20m north of site.
2006 (1:10,000)	Current fire training ground now present on map.	Newmarket Road Park & Ride present 20m north.
2020 (1:10,000)	Balancing Ponds present on site.	Electrical substations noted within the North Works.

Source: (Landmark, 2020a)

Table 2-2: Land east of Cambridge Airport - Site History

Dates (map scale)	On site	Off-site
1886 – 1888 (1:10,560)	Majority of plots are agricultural land. Plot B contains Greenhouse Farm and plantation. Quy Water Farm is on the southern boundary of Plot E.	Majority of the surrounding site is agricultural land with some farm buildings. The village of Teversham lies to the west of Plot F.
1948 (1:10,560-aerial photography)	No significant changes.	Cambridge Airport is present to the south and west.
1970-1975 (1:10,000)	No significant changes.	Garage located 10m west of Plot B.
2020 (1:10,000)	Newmarket Road Park & Ride located on Plot B. Runway approach lights, associated with the airport, are present on Plot C.	No significant changes.

Source: (Landmark, 2020b)

2.3 Historical landfill sites

Historical landfill maps (DEFRA, 2020) indicate that there are six historical landfill sites within 1km of the site (Table 2-3). The location of these can be seen within Figure A.3 (Appendix A).

Table 2-3: Historical landfill sites

Name	Location (direction)	Input dates	Waste type
Quy Mill Hotel	420m (NE)	30/11/1989 – 31/12/1992	Inert
Quy Bridge	190m (NE)	31/12/1990 – 30/09/1992	Inert
Coldhams’s Lane	30m (S)	31/01/1962 – 31/12/1979	Industrial, commercial and special household
Norman Works	30m (S)	31/12/1978 – 20/10/1984	Industrial
Coldham’s Lane Tip	400m (SE)	31/01/1962 – 31/05/1971	Commercial
Cement Works Tip	750m (SE)	31/05/1971 - unknown	Commercial

A previous report (Mott MacDonald, 1999) on the landfill sites located south of Coldham’s Lane detailed the known extent of waste within the pits.

Coldham's Lane Tip is noted within the report as "Former Biffa Landfill". The report states that "this site is approximately 5 ha in area and was formerly a quarry for extraction of Chalk for cement manufacture at the Normal Cement Works (now demolished). Cambridge City Council (under planning consent from Cambridgeshire County Council) commenced deposition of domestic and trade waste in 1962 and ceased deposition in about 1969. It now has household and construction waste to a depth of 16m" (Mott MacDonald, 1999).

The Cement Works Tip is noted in the report as "former Cambridgeshire County Council landfill-northern area". The report states that: "this site is approximately 4.75 ha in area. The site was also formerly a quarry for the extraction of Chalk for cement manufacture. Cambridge City Council commenced deposition of domestic and trade waste in 1972… deposition ceased in 1974. The area now contains landfilled waste to a depth of 14m. The waste comprises household refuse and construction debris in a sandy clay matrix" (Mott MacDonald, 1999).

Coldham's Lane is noted in the report as "former Cambridgeshire County Council landfill-southern landfill". The report states the site is: "approximately 14 ha in area. Biffa commenced commercial operation of the site in 1978 as a landfill licensed for industrial, commercial and domestic waste, acting as agents for Blue Circle. The site operation reverted to Blue Circle in 1987. The site was closed to industrial waste in April 1989, but continued to accept household waste until the end of the year. The landfill now contains waste to depths of between 11.5 and 22.5m" (Mott MacDonald, 1999).

2.4 Environmental Setting

2.4.1 Geology

The 1:50,000 scale British Geological Survey (BGS) map (Cambridge- Sheet 188) and previous ground investigations indicate that the general geology at the site comprises solid deposits of the West Melbury Marly Chalk Formation of the Grey Chalk Subgroup. This is underlain by the Gault Formation. The Cambridge Greensand, which is sometimes present between the Chalk and Gault, may be present in very thin bands at this site. Superficial deposits of Quaternary River Terrace Deposits (4th River Terrace Deposits- RTD) are known to be present in some places. The BGS maps indicate that, to the east of Site F, peat may be present. Where both superficial deposits are present, the peat overlies the RTD.

2.4.2 Hydrology and hydrogeology

The West Melbury Marly Chalk is classified by the Environment Agency as a Principal aquifer overlain by the River Terrace Deposits which are classified as a Secondary A aquifer. Peat is classified as unproductive in terms of aquifer designation.

The site does not lie within a groundwater source protection zone.

Previous site investigations in the area have indicated that the groundwater within the RTD, where present, and Chalk may be in continuity, although an observed rise in water levels during investigations suggests that the Chalk groundwater may be slightly confined beneath a layer of shallow clayey Chalk. Based on previous ground investigation data, the groundwater in the Chalk generally flows to the north. However, local variations have been noted during previous investigations.

A drain runs through Plot A and flows from the south to the north east where it drains to Quy Water, which is located approximately 250m east of Plot F. There are several drains on Plot F that also drain to Quy Water. A drain runs between Plots C and D and there are several drains along the A1303, likely highway drainage. There are no known springs in the area.

A pond is located within Barnwell East Local Nature Reserve, located adjacent to the western boundary of Plot A. In addition, Cherry Hinton Lakes are located south of Coldham's Lane.

There are no known groundwater abstractions within 1km the area. There are no known surface water abstractions within 1km of the site.

3 Existing information within Site Boundary

3.1 Previous site investigations and remediation

This section summarises the existing information available pertaining to land contamination within the Site boundary. It is noted that investigations and remediation works have also been conducted outside of the Site boundary (North Works, Jaguar Land Rover, petrol station and Land North of Cherry Hinton); these are not part of the RAG assessment but have been summarised in Section 5 as examples of good practice.

3.1.1 Initial Environmental Site Assessment

An Initial Environmental Site Assessment was undertaken in 2003 (Mott MacDonald, 2003) to determine whether the Cambridge Airport site, the North Works and the area north of Cherry Hinton would be suitable as an urban extension to the City of Cambridge. This included a review of several environmental reports held by Marshall, dated between 1991 and 2003.

The report identified “a number of known or potential sources of soil and groundwater contamination… arising from past activities” with “hot spot locations with specific activities and operational practices both in the past and at present”.

The report noted several “known sources of contamination on site” including:

- The old fire training grounds:
  - containing mineral oils from the fuel used for fire training exercises which extended 2-3m below ground level (bgl). However, there was no evidence for migration of these contaminants and so remedial action was only advised in the case of redevelopment in these areas.
- South Works:
  - Adjacent to Hangar 12. A National Rivers Authority site inspection noted a potential source of ground contamination from waste oils and solvents stored in two bunded tanks at this location (see section 3.2.1 for further information).
  - A ground investigation undertaken to the east of Hangar 1 was carried out in January 2003. One exploratory hole was located near to an underground fuel tank. A fuel odour was noted to 2.5m bgl and black hydrocarbon staining was recorded. Laboratory analysis indicated elevated Total Petroleum Hydrocarbon (TPH) concentrations with values between 2500 and 3200 mg/kg (see section 3.2.3 for further information).

In terms of off-site sources, the report considered that “due to the low permeability of the Chalk Marl, it is considered unlikely that the groundwater beneath the site is contaminated by pollutants originating off-site”.

3.1.2 Aircraft Engine Ground Running Enclosure (GRE)

In 2019 Arcadis completed a Remediation Strategy Completion Report (Arcadis, 2019) for construction of the new Aircraft Engine Ground Running Enclosure (GRE) located in the south western area of the South Works. The remediation strategy, completed by Peter Brett Associates in 2017, was approved by Cambridge City Council and South Cambridgeshire District Council and concluded that soil and groundwater remediation was not required because,

following review of ground investigation data and risk assessment, it was concluded that no unacceptable risks to human health or controlled waters were present. However, ground gas monitoring confirmed that ground gas mitigation measures were required in the new building, this was installed and verified by Arcadis.

Arcadis also reported on verification activities in terms of material reuse on the site under a Materials Management Plan, which confirmed that the material reused was suitable for use. An unexpected contamination protocol was in place during site works which identified a small amount of unsuitable material (bituminous material and asbestos impacted material) that was segregated and removed from site during the works.

3.2 Historical records held by Marshall

3.2.1 Pollution prevention and control audits

Site inspections were undertaken in 1994 and 1996 by the Environment Agency (National River Authority, prior to 1996). The records (National Rivers Authority, 1994) and (Environment Agency, 1996) noted several non-permitted discharges to controlled waters at Hangars within the south works and other discrete locations across the south works. In addition, potential pollutant sources were noted at the South Works including tanks and chemical storage located west of Hangar 12.

3.2.2 Investigation of possible soil contamination

Following the Environment Agency site inspections, Marshall appointed Resource Consultants Cambridge (RCC) to investigate whether contamination was present at in the area of Hanger 12 (RCC, 1995).

The area was found to be contaminated by mineral oil, lead, zinc and copper at concentrations above accepted standards. The impacted soils were at a limited depth and so the report recommended that the material was excavated and disposed of at an appropriate facility before being backfilled with clean material.

After discussions with Marshall, it is understood that this recommendation was followed.

3.2.3 Remediation of underground fuel tanks to east of Hangar 1

Remediation activities were undertaken associated with contamination identified in a borehole next to an underground fuel tank to the east of Hangar 1. According to Marshall records, two underground storage tanks at Hanger 1 were subsequently decommissioned and removed, prior to capping of the area with concrete as part of the Hangar 22 development. It is understood that hydrocarbon impacted soils remain in place underneath the capping layer.

3.3 South Works and Airport Processes and Activities

Discussions were held with Marshall on 18th September 2020 pertaining to the building uses and activities. These can be seen in Figure A.4 (Appendix A).

The main activities at site, with potentially contaminative impacts, include:

- Activities associated with aircraft maintenance, repair and overhaul (MRO);
- Storage of fuel, oil and other liquids.

3.3.1 Underground Storage Tanks

There are nine Underground Storage Tanks (USTs) located within the South Works and Airport site. These contained either jet fuel or aviation gasoline. The tanks were installed between 1937 and 1982. Two tanks adjacent to Hangar 1 were removed in 2008 and a tank adjacent to the Engine Running Mound was removed in 2003. The remaining tanks have been decommissioned.

The location of these tanks can be seen in Figure A.5 (Appendix A).

3.3.2 Above Ground Storage Tanks

There are several above-ground storage tanks (AST) located on the South Works. These are predominantly used to store fuel oil, waste oil and developer fluid (Non-Destructive Testing (NDT) building). These, alongside an environmental compound and liquid oxygen compound, are located on the South Works. In addition, foams associated with the fire training ground are stored south of Plot A, adjacent to the FTG.

Marshall has a licence for dispensing and storage of fuel under a Petroleum Licence from Trading Standards. The AST are reported, by Marshall, to be compliant with the Control of Pollution (oil storage) Regulations, 2001. Some tanks are no longer in use but remain in-situ (cleaned and decommissioned), whilst those that remain either have continuous pour concrete bunding or an integral arrangement.

The location of these can be seen in Figure A.5 (Appendix A).

4 RAG Assessment

4.1 RAG Assessment Methodology

The contaminated land appraisal considered the potential risk from contaminated land at each of the Plot areas.

The Plot areas were subject to detailed screening by review of:

- Historical mapping;
- Previous ground investigations;
- Previous and current site uses (based on information from Marshall); and
- Previous known spills, pollution incidents or contaminant hotspots encountered during previous investigations.

The screening reviewed historical potential sources of contamination on and in close proximity to the site areas, considering potential migration pathways for contaminants and presence of sensitive receptors.

Where no sources were found to be present on site or adjacent off-site, the site area was considered ‘green’ i.e. lower risk. Where known sources, which are less likely to cause contamination, are located on site, these are considered ‘amber’ i.e. medium risk. Where known sources, which are more likely to cause contamination, are located on site, these are considered ‘red’ i.e. higher risk.

The RAG definitions devised to assess the risk of contamination at the shortlisted site areas are shown in Table 4-1.

Table 4-1: Contaminated Land – RAG definitions

Green	Amber	Red
Lower risk of contamination for development- no known sources present	Medium risk of contamination for development – potential sources present on site which are less likely to cause contamination	Higher risk of contamination for development – known sources present on site which are more likely to cause contamination

4.2 Airport -site assessment

The Envirocheck report for the study area for Plot A has identified potential for contamination. The site became an airport in the 1940s and since then there have been several phases of development associated with the airport. This includes activities associated with aircraft maintenance, repair and overhaul. Fuel and oils have historically been stored on site in USTs, although these are now decommissioned, but existing ASTs are still in use.

Sensitive human health receptors include construction workers, future residents and adjacent residents located to the north and south of the Plot. The RTD are designated as a Secondary A aquifer and are present in small areas beneath the site. The Principal aquifer of the West Melbury Marly Chalk is present below the entire site.

Review of the Envirocheck report and historical mapping has identified potential sources of contamination in Plot A. However, the majority of these sources are localised to the South Works and contamination is likely to be in “hot spots”. The site uses, processes and activities on site have been categorised in Figure A.6 (Appendix A), depending on their likelihood of causing

contamination. Offices and canteens are considered lower risk of contamination (green), light aircraft hangars and ASTs are considered medium risk (amber), assuming they have been installed to current best practice, and aircraft MROs or USTs are considered higher risk (red).

Due to the presence of higher risk contamination processes and activities at the airport, Plot A has been considered as between higher (red) and lower (green) risk from contamination.

4.3 Areas east of airport -sites assessment

The historical maps (Landmark, 2020b) for Plots B to F indicate that the sites have limited potential for contamination. Rural land has been predominantly undeveloped and used as agricultural land except Plot B, which is now used as a Park and Ride site. The surrounding area is largely undeveloped, remaining rural and agricultural land since maps began, except the petrol station located adjacent to Plot B and the landfills located between Plots D and E. The village of Teversham lies to the west of Plot F and Cambridge Airport lies to the south and west of the sites.

Sensitive human health receptors include construction workers, future residents and adjacent residents within Teversham and the farms north of the A1303. The RTD represents a Secondary A aquifer present in the small areas beneath the site and the Principal aquifer of the West Melbury Marly Chalk is present below the entire site.

An assessment of each of the plots, and its risk from contaminated land, is presented below.

4.3.1 Plot B

Review of historical mapping and previous reports for nearby sites have identified potential sources of contamination at Plot B and the surrounding area including the Park & Ride located on site and the adjacent petrol station. However, the petrol station adjacent to the site was subject of a remediation statement in 2014 (Mott MacDonald, 2014) (see Appendix B (0)) which concluded that a full remediation strategy was not required at the petrol station, as the “hot spots” of contamination would require small scale remedial works involving removal and validation testing. It was noted that, following construction of the new petrol station, the contamination risks would be significantly reduced as the tanks will include tertiary containment systems and there would be a lower chance of thefts and the hardstanding at site would be renewed. Therefore, Plot B is considered to be at **medium risk** from contamination (amber).

4.3.2 Plot C

Review of the historical mapping and previous reports for nearby sites have identified limited development at Plot C and within the surrounding area and therefore is it unlikely that significant sources of contamination are present. Plot C is considered to be at **lower risk** from contamination (green).

4.3.3 Plot D

Review of the historical mapping and previous reports for nearby sites have identified limited development at Plot D and within the surrounding area and therefore is it unlikely that significant sources of contamination are present. Plot D is considered to be at **lower risk** from contamination (green).

4.3.4 Plot E

Review of the historical mapping and previous reports for nearby sites have identified limited development at Plot E and within the surrounding area and therefore is it unlikely that significant

sources of contamination are present. Plot E is considered to be at **lower risk** from contamination (green).

4.3.5 Plot F

Review of the historical mapping and previous reports for nearby sites have identified limited development at Plot F. Within the surrounding area, the landfills located east of the site are potential sources of contamination. However, these contain inert waste and are located over 130m to the north east. The groundwater flow direction in this area is likely to be towards the north, following Quy Water, and so is unlikely to be leaching contaminants towards Plot F. It is therefore considered unlikely that the landfills located off-site are significant sources of contamination. Plot F is considered to be at **lower risk** from contamination (green).

5 Previous site investigations and remediation outside of red line boundary

5.1 Developments within Marshall owned land

5.1.1 Newmarket Road Petrol Station Storage

A Remediation Statement was prepared in 2014 (Mott MacDonald, 2014) for an existing/proposed petrol station located to the north of the A1303 (Newmarket Road) and to the west of the Park & Ride. The existing petrol station included seven fuel storage tanks, six of which were underground single skinned tanks and one of which was a self-bunded above ground tank. The proposed plans included a new, larger petrol station installed in the location of the existing petrol station with underground storage tanks.

The report concluded that a full remediation strategy was not required at the petrol station, as the “hot spots” of contamination would require small scale remedial works involving removal and validation testing. Mitigation measures were recommended for the decommissioning of the existing petrol station and design, construction and operation of the proposed petrol station. It was noted that, following construction of the new petrol station, the contamination risks would be significantly reduced as the tanks will include tertiary containment systems and there would be a lower chance of thefts and the hardstanding at site would be renewed.

5.1.2 Jaguar Land Rover

In 2015 a Phase I Desk Study and Phase II Geo-Environmental Interpretive Report (Mott MacDonald, 2015) was prepared for the potential redevelopment of the Jaguar Land Rover site, along Newmarket Road, Cambridge.

The report was based on a ground investigation undertaken in February 2015. Groundwater monitoring identified chromium (III) in the River Terrace Deposits aquifer which were above Environmental Quality Standards (EQS). TPH, trichloroethene, tetrachloroethene and cis-1,2-dichlotoethene were identified within the Chalk aquifer above Drinking Water Standards (DWS). These were regarded to be a result of a number of sources on site and, in addition, the Chalk aquifer in this area is known to have previously been impacted by historical volatile contamination. Soil sampling did not identify any exceedances of assessment criteria relating to a commercial end use. Remediation was not deemed to be required based on the proposed end use, and assuming development will comprise hardstanding at ground level which will remove the pathway to site end users.

5.1.3 Marshall Aircraft Design Office (ADO) building

The Marshall ADO building located on Newmarket Road, Cambridge, was demolished in order to convert the land from office space to car showrooms. A generic quantitative risk assessment (GQRA) (Mott MacDonald, 2018) was completed in order to establish any contaminated land risks and any associated recommended remediation.

A ground investigation at the site identified black staining with trial pits on site. This coincided with some elevated concentrations of PAH and TPH within the made ground. However, these values were below human health generic assessment criteria. Leachate samples contained metal and PAH exceedances of DWS and EQS. However, groundwater samples did not exceed

DWS or EQS and it was concluded that potentially mobile contaminants in the soils were not leaching into the groundwater.

The report identified low risks to all receptors and recommended that remediation at the site is not required based on the proposed end use having hardstanding across the site.

5.1.4 Project Wing (Marleigh) Development

A Remediation Strategy (Mott MacDonald, 2019) was completed following outline planning permission being granted for the Wing Development- a new mixed use commercial and residential development to the north of Cambridge Airport (including the North Works).

Remediation includes ground gas and vapour protection measures in all new buildings, with a vapour trench installed along the western site boundary to act as a preferential pathway for shallow vapours to vent to air.

Groundwater contamination in the western area of the site is well understood as a result of multiple phases of ground investigation. Groundwater remediation, using reductive dichlorination, is currently being undertaken in this area in order to mitigate risks from chlorinated solvents and Chromium VI. Soil remediation proposals vary depending on the proposed future land use. Details of proposed remediation options can be found within the report (Mott MacDonald, 2019).

5.1.5 Land North of Cherry Hinton (LNCH)

A Phase 2 Ground Conditions and Land Contamination Assessment report (Peter Brett Associates, 2019) was completed in 2019, in order to assess ground, surface water and groundwater conditions in support of an outline planning application, including an Environmental Statement, for a new mixed-use development in the area known as the Land North of Cherry Hinton (LNCH).

Works included two ground investigations undertaken in October 2016 and September/October 2017. These ground investigations were concentrated in the following areas:

- Southern boundary of airport (to determine whether there is groundwater migration from nearby landfills);
- Area of historical features – located west of the current fire training ground;
- Area of historical fire training ground;
- Area of current fire training ground; and
- General site coverage.

These works identified “distinct and spatially limited areas of soil contamination hotspots that require mitigation to manage potential risks to future residential users.” In addition, groundwater sampling identified “some limited areas of groundwater contamination that theoretically present a risk to groundwater abstractions” but that “remediation works for soil contamination would have a beneficial effect on groundwater”. In addition, it was determined that there was no impact from leachate migrating from the landfills, located on the southern site of Coldham’s Lane, to the area beneath the site.

Ongoing investigations and monitoring are currently underway to characterise the contamination identified in groundwater in the area of the fire training grounds comprising PFAS and PFOS. Discussions are also being held with the Environment Agency and Cambridge City Council who require some remediation to reduce future groundwater risks. Workable remediation options have been identified and agreed with all parties, these are being trialled.

5.2 Local airfields

5.2.1 Waterbeach Barracks and Airfield

In July 2020 a remediation scheme was approved for the development of up to 6,500 dwellings, 16,500m^2 of retail use, 15,000m^2 of commercial use and a number of schools and community uses at Waterbeach Barracks and Airfield 8km north of Cambridge City Centre. The site was part of a former military barracks and airfield, planning documents are available on the South Cambridgeshire District Council planning portal.

This site has been reviewed as a local example of successful planning approval for a site where similar contamination risks are likely to be present due to the comparable land uses and environmental site setting. The identified risks at Waterbeach Barracks were as would be expected for this type of site and required standard mitigation and/ or remediation measures only, these included:

- Removal of tanks and remediation of any impacted soils identified during removal works;
- Removal of localised hotspots of soil contamination which generally comprised hydrocarbon impacts;
- Assessment of reused materials to ensure suitability;
- Use of ground gas protection measures in new buildings;
- Use of imported capping materials where required (in allotments).

It is considered likely that development of Cambridge Airport would require similar assessment and mitigation measures.

5.3 Consultation

Since 2003, when Cambridge City Council were developing their prioritisation list of potentially contaminated land sites under Part 2a of the Environmental Protection Act 1990, Marshall have consulted with regulators. This has included provision of relevant documentation and discussions surrounding planning applications and remediation, ensuring that the regulators are kept informed and involved with land quality at the airport.

6 Conclusions

6.1 Conclusions

The overall RAG assessments for each Plot have been summarised below in Appendix A (A.6). The assessment has concluded that, whilst hotspots of contamination are likely within Plots A and B, the majority of the Site can be classified as 'green', lower risk, in terms of land contamination. The lower risk areas are not anticipated to pose a risk to future development.

Table 6-1: Summary of risk areas in terms of total site area

Plot	Area (ha)	Area designated 'Red'		Area designated 'Amber'		Area designated 'Green'	
		(ha)	% plot area	(ha)	% plot area	(ha)	% plot area
A	472.4	14.8	3.1%	67.9	14.4%	389.7	82.5%
B	18.8	0.0	0%	18.8	100%	0.0	0%
C	12.9	0.0	0%	0.0	0%	12.9	100%
D	39.4	0.0	0%	0.0	0%	39.4	100%
E	15.1	0.0	0%	0.0	0%	15.1	100%
F	289.5	0.0	0%	0.0	0%	289.5	100%
Total in safeguarded plots (A, B and C)	504.1	14.8	2.9%	86.7	17.2%	402.6	79.9%
Total in green belt plots (D, E and F)	344.0	0.0	0%	0.0	0%	344.0	100%

The types of contaminants that are likely to be encountered in the amber and red areas comprise hydrocarbons from fuel storage, solvents from aircraft maintenance and metals from paints. These are all common contaminants associated with airfields and general industry and remediation methods are well known and proven for these contaminants. The examples within Section 5 of this report summarise likely contaminants and remediation or mitigation measures that have enabled development on similar sites in terms of land use and environmental setting. This confirms that, if encountered, the risks can be effectively mitigated to support development in all areas of the site.

More complex contaminants are known to be present in the area of the fire training grounds in Plot A (PFAS and PFOS). These are more difficult to treat as they are very persistent in the environment. However, Marshall is currently completing design verification testing for groundwater remediation in this area, which has been agreed with the Environment Agency (see Section 5).

Marshall have committed remediation of solvents in groundwater at the North Works and therefore have experience of remediation techniques which are being implemented locally to the Site. A summary of this and other Marshall developments local to the Site including contamination findings and suitable mitigation requirements are included in Section 5.

A. Drawings

A.1 Site Location

A.2 Historical site uses

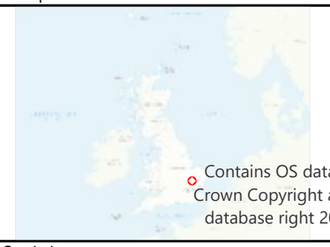
A.3 Historical landfill sites

A.4 Current processes and activities

A.5 Liquid Storage Facilities (USTs and ASTs)

A.6 RAG Assessment of land uses

Location Map



Key to Symbols

Red Line Boundary

Notes

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Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	13/10/20	HBS	Site Location	JS	JD

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Title

Cambridge East
RAG Assessment
Site Location A.1

Designed	H Small		Eng Check	H Small	
Drawn	F Lastname		Coordination	J Southall	
GIS Check	H Small		Approved	J Dottridge	

Scale at A3	Status	Rev	Security
1:17,534	PRE	P1	CONF

Drawing Number

PPPPPP-MMD-00-XX-GIS-Y-XXXX

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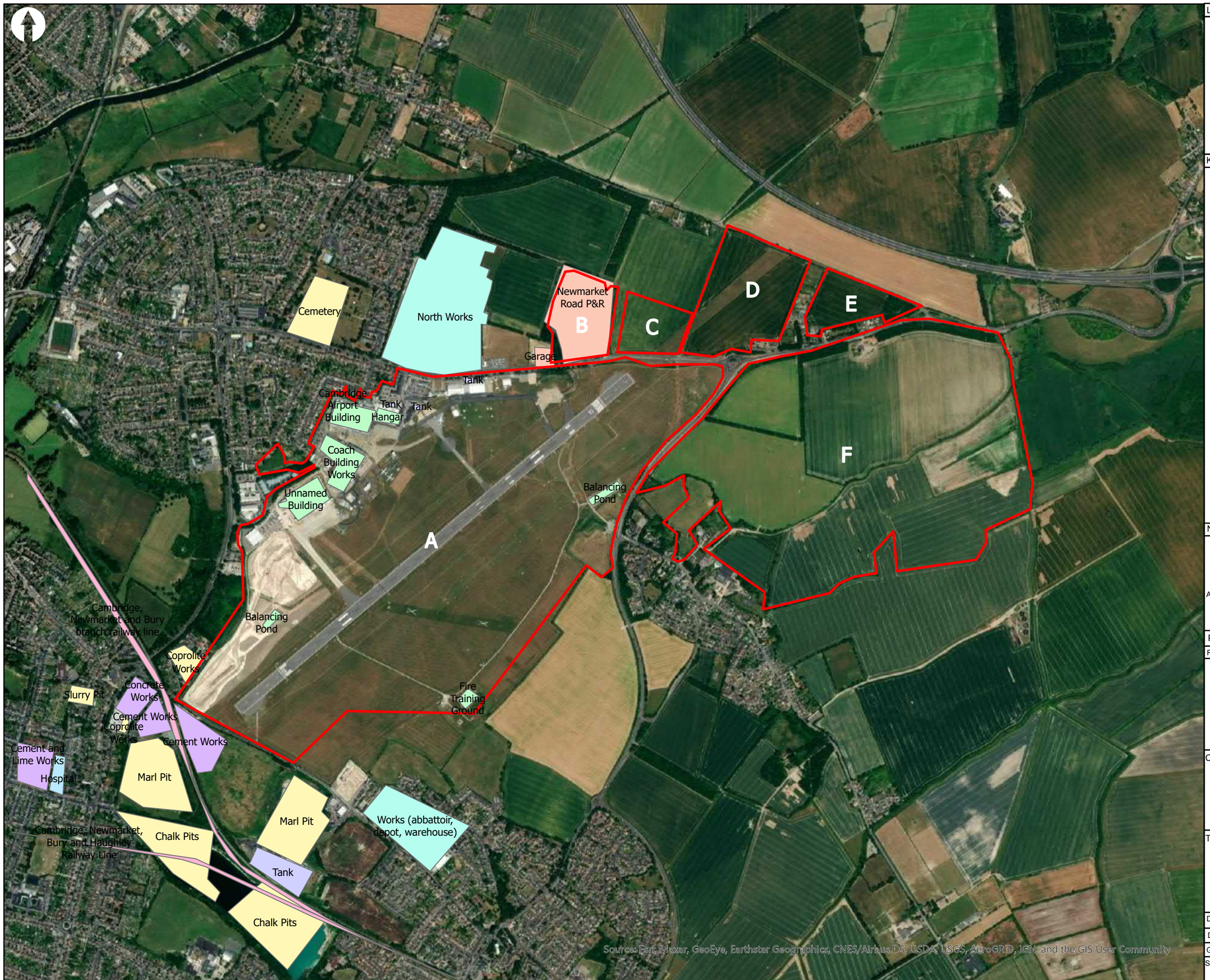
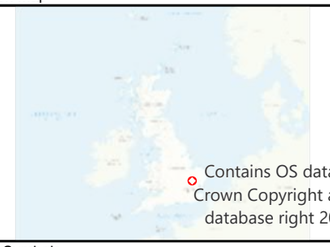


Location Map



Key to Symbols

- Red Line Boundary

Historical Site Uses

Type

- Airport associated
- Concrete or cement works
- Garages or vehicle related
- Hospital
- Mining, pits, infilled land
- Railway
- Tanks
- Works

Notes

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Title

Cambridge East
RAG Assessment
Historical site uses A.2

Designed	H Small		Eng Check	H Small	
Drawn	H Small		Coordination	J Southall	
GIS Check	H Small		Approved	J Dottridge	

Scale at A3	Status	Rev	Security
1:22,316	PRE	P1	CONF

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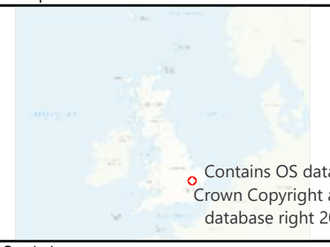
Location Map



Key to Symbols

Red Line Boundary

Historical Landfill Sites

Notes

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Title

Cambridge East
RAG Assessment
Historical Landfill Sites A.3

Designed	H Small		Eng Check	H Small	
Drawn	H Small		Coordination	J Southall	
GIS Check	H Small		Approved	J Dottridge	

Scale at A3	Status	Rev	Security
1:21,519	PRE	P1	CONF

Drawing Number

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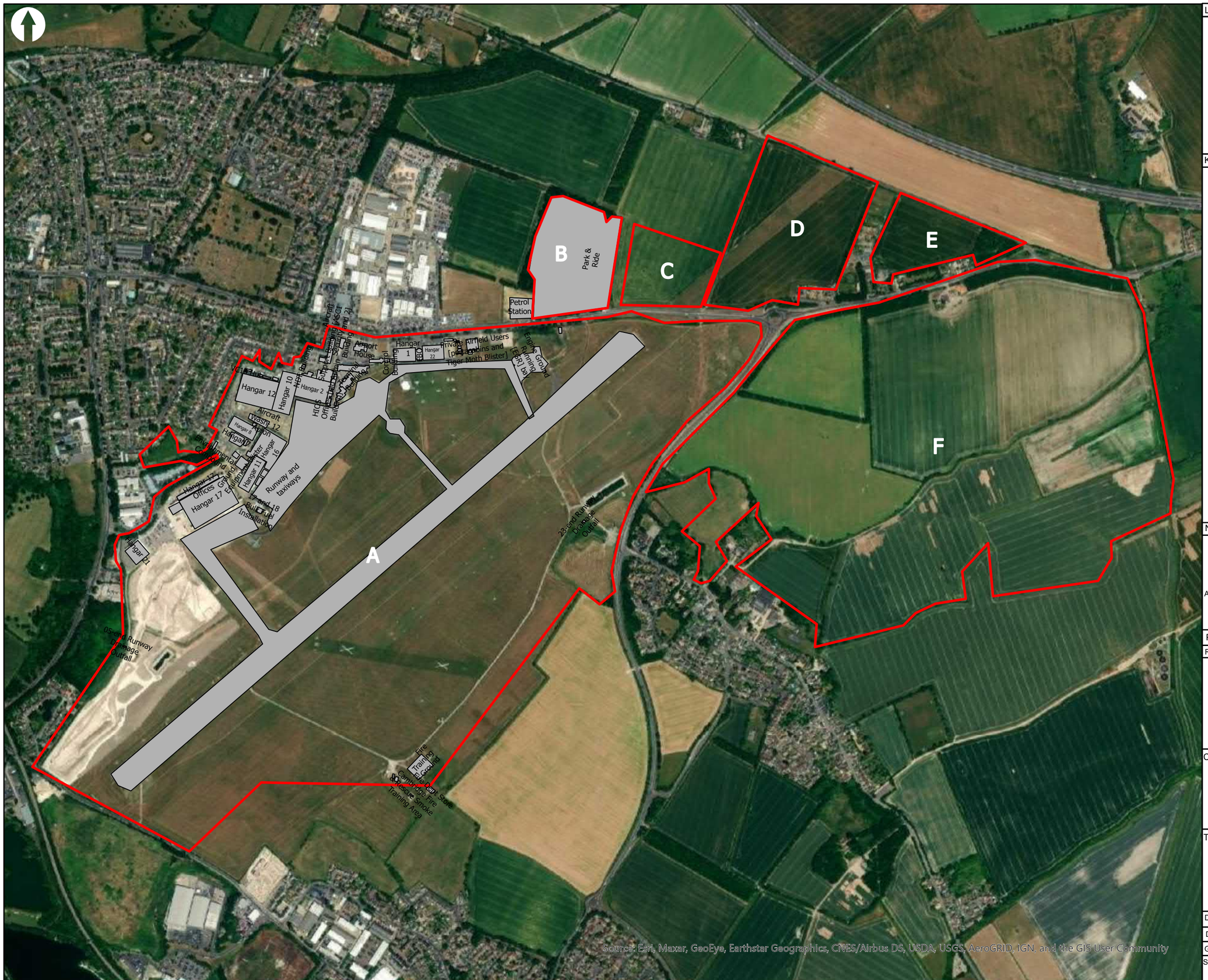
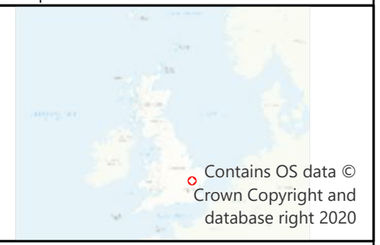


Location Map



Key to Symbols

Red Line Boundary

Processes and Activities

Processes and Activities

Notes

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Title

Cambridge East
RAG Assessment
Processes and Activities A.4

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Drawn	H Small		Coordination	J Southall	
GIS Check	H Small		Approved	J Dottridge	

Scale at A3	Status	Rev	Security
1:16,737	PRE	P1	CONF

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Location Map

Key to Symbols

- Red Line Boundary
- Liquid Storage Facilities (above ground)
- Underground Storage Tanks (disused)

Notes

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Title

Cambridge East
RAG Assessment
USTs and ASTs A.5

Designed	H Small		Eng Check	H Small	
Drawn	H Small		Coordination	J Southall	
GIS Check	H Small		Approved	J Dottridge	

Scale at A3	Status	Rev	Security
1:10,374	PRE	P1	CONF

Drawing Number
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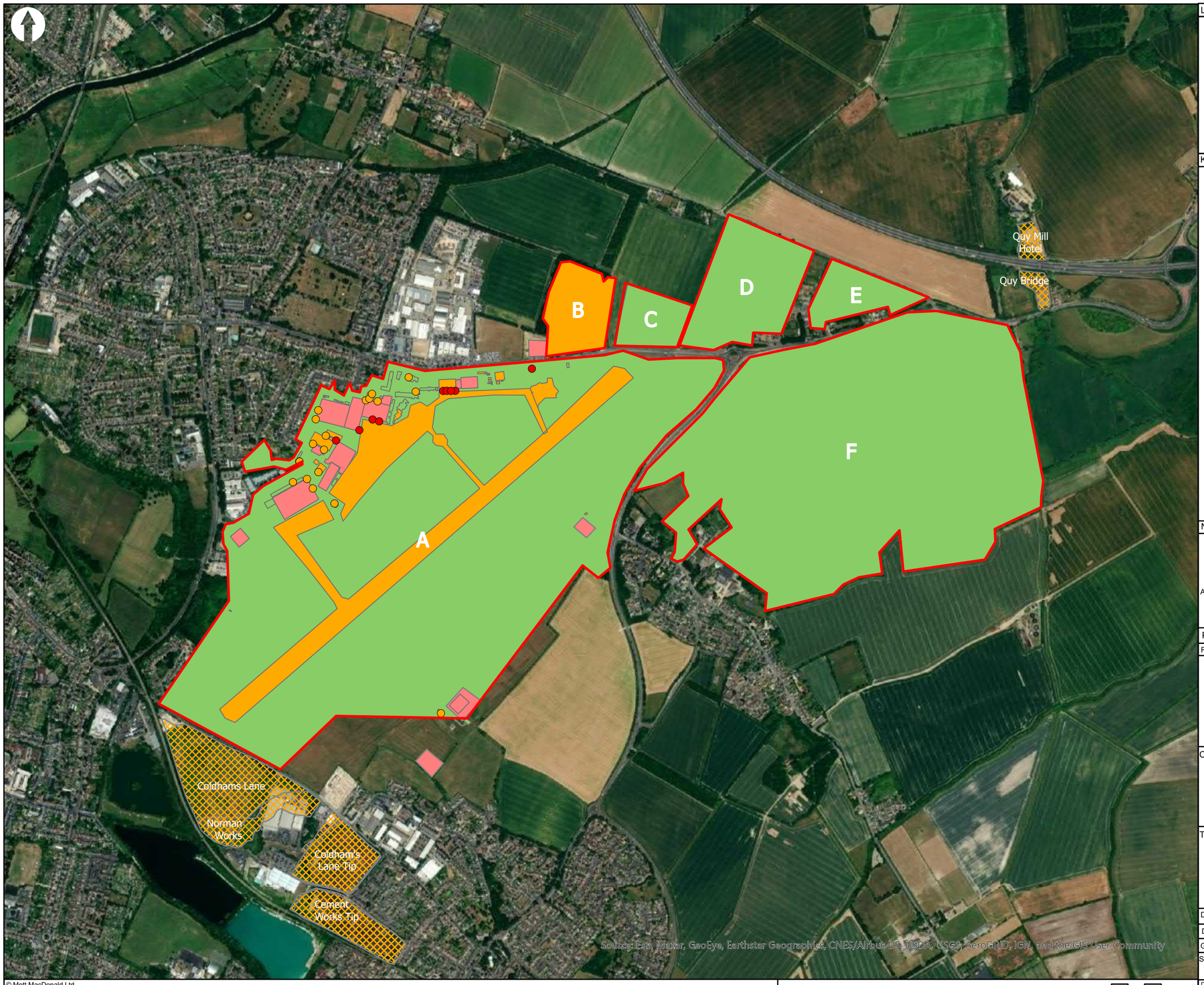

Location Map

Key to Symbols

- Red Line Boundary
- Liquid Storage Facilities (above ground)
- Underground Storage Tanks (disused)
- Historical Landfill Sites

RAG

- Green
- Amber
- Red

Notes

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Title

Cambridge East
RAG Assessment
RAG Site Use A.6

Designed	H Small		Eng Check	H Small	
Drawn	H Small		Coordination	J Southall	
GIS Check	H Small		Approved	J Dottridge	

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Drawing Number

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