Main Gate Planning Application Contaminated Land Risk Assessment

Produced by Sellafield Ltd Contaminated Land Specialist, Land Quality and End States

1. Introduction

This Contaminated Land Risk Assessment has been produced as part of a full planning application for improvements to the main gate area of the Sellafield site. The development includes:

- The replacement of a single bus shelter with three shelters;
- The addition of two security kiosks;
- A new floodlighting column and feeder pillar at a maximum of 16m above surrounding ground level; and
- Re-aligning of bus lanes and queuing areas to allow for safer routes for pedestrians and vehicles (following conversations with the Planning Officer, it has been agreed that these works will be carried out as permitted development).

The main location and main features of the development are shown in Figure 1, please see the Planning, Design and Access Statement for full details of the works.

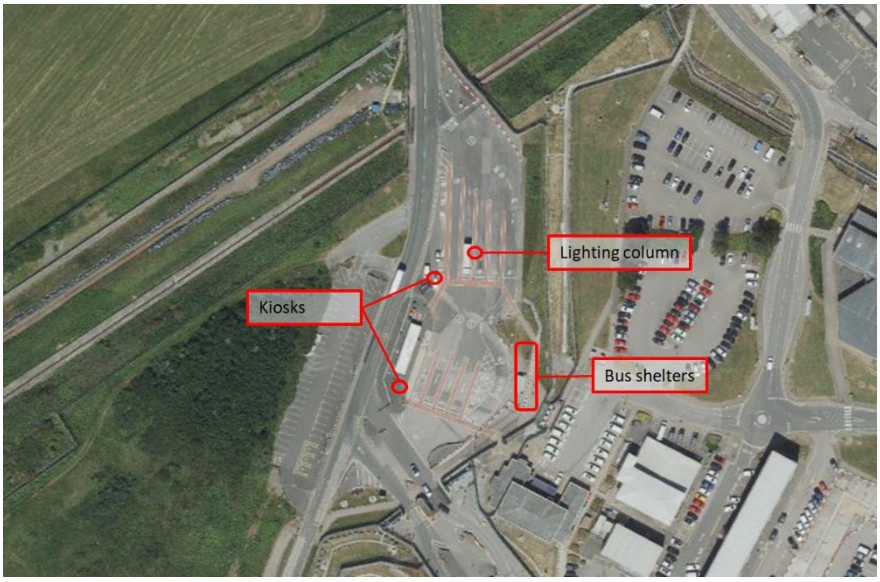


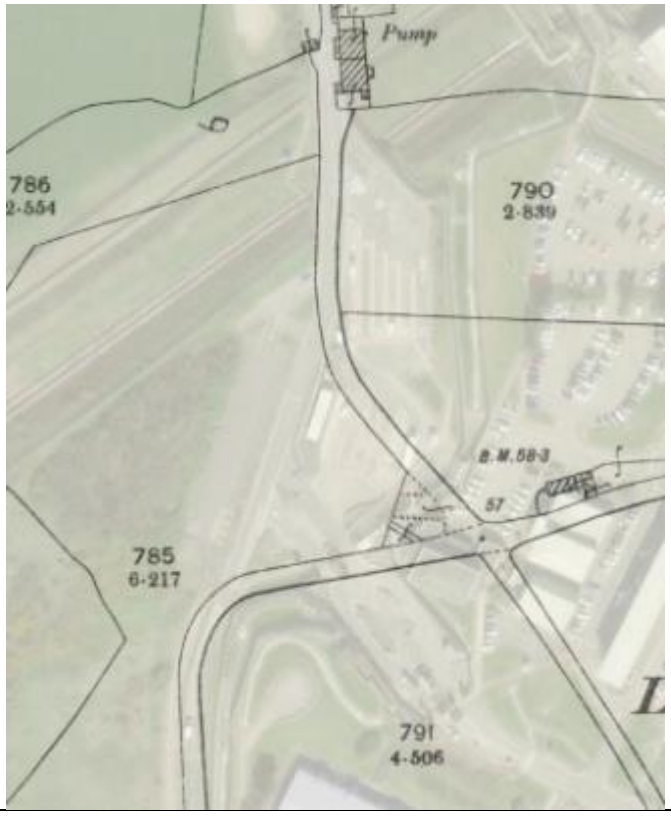
Figure 1. Approximate locations of the main proposed enhancements to the Bus Lanes outside Main Gate.

The nature of the development means that there will be limited interaction with the ground, and most excavations will be very shallow (eg. resurfacing, fixing prefab structures to the ground, etc). However, it is understood that the installation of the lighting column will require piling into deeper ground to provide support and stability for the column.

Given the industrial use of the Sellafield site it is recognised that the potential for contaminated land must be considered as part of the planning application, although it is noted that the development is located outside of the site boundary fence. This Contaminated Land Risk Assessment will review existing information (historic maps, aerial photos, records of potential incidents, boreholes and monitoring data, etc) and consider the risk of land contamination.

2. Area History

The history of the area around Main Gate is reviewed below with reference to historic maps and aerial photos.

Year		Comments
c. 1900		Before the construction of the Royal Ordnance Factory in the 1940s the site was farmland, and the Main Gate area was previously a crossroads surrounded by fields.

1946		When the ROF was built the main gate was located at the crossroads shown on the previous map, and the main road south straightened. The area to the north of the Main Gate became the main bus lane area with a series of inspection / drop off bays and turning circle.
1951		In 1950 the sealines were created in a trench to the north of the bus lanes. The carpark on the large turning circle outside the Main Gate was removed and the whole area grassed over.
1964		In the 1960's the layout remained broadly the same, but the Main Gate was moved slightly to the north and a car park area created to the west. The shelters were removed from the inspection / drop off bays, but the raised kerbs remained in place.

1986		In the early 1980's the majority of the turning circle was removed and new vehicle inspection / queueing lanes were put in place. The main gate and site access was moved to the south into its current position.
2018		In 2017 the former bus bays were removed and replaced by additional inspection / queueing lanes. This remains the current layout.

The above aerial images show that there has been incremental development of the Main Gate area over the lifetime of the Sellafield site but the overall footprint and historic use of the area

has remained broadly the same. The area has only been used for bus lanes, inspection bays and parking areas with no evidence of additional industrial use.

3. Records of incidents

Throughout its history Sellafield has kept records of incidents and events, such as leaks, spills, and contamination finds that may lead to contamination or are evidence of contamination. Currently any such incident is recorded in the ATLAS database, incidents before c.2000 were recorded in the Events Database with records going back to the 1950s. A review of these records has not identified any contaminative events occurring in the area of the bus lanes.

The nearest records of contamination to the development area include a diesel leak from a vehicle to the east of the Main Gate and 2 finds of asbestos cement material in made ground during excavations within the Sellafield site boundary.

There have been several recorded leaks from the sealines to the north of the development area but the leaks were restricted to the area of the trench and no radiological levels of concern have been identified in the groundwater in the development area, as shown in Section 4.

4. Groundwater monitoring

Sellafield has a large number of boreholes that are part of the site groundwater well monitoring network. Using this network, the groundwater across and offsite is regularly monitored to ensure environmental compliance and to track and monitor contamination. While the majority of the monitoring wells are located within the Sellafield site boundary a number are located off-site.

Borehole 9782 is located within the development area, on the grassed area immediately to the north of the proposed bus shelters. The well was installed in 2015 and the groundwater is analysed up to 4 times a year for a range of radiological analytes. Table 1 shows the maximum and minimum levels recorded since 2015 taken from LQDMS (Land Quality Data Management System).

Table 1. Maximum and minimum radionuclides in groundwater from borehole 9782

Analyte	**Minimum (Bq/l)**	**Maximum (Bq/l)**
Total Beta	0.228	0.977
Carbon 14	0.442	1.010
Strontium 90	0.079	0.371
Tritium	1401.067	6438.239

While the results do show that radionuclides are present in the groundwater all the results remain below that of drinking water standards produced by the World Health Organisation detailed in *Guidelines for Drinking Water Quality 4th Edition* (2017). As such the levels recorded are not of significance with regards to land contamination.

In addition to the radiological analysis the depth to groundwater was recorded during sampling visits, these dip tests show the groundwater to be between 7.2 and 8.9 mbgl (metres below ground level). This means that the proposed piling could go into groundwater depending on the depth required.

5. Geotechnical Borehole

As part of the development preworks a geotechnical borehole was drilled in the position of the proposed lighting column. 8 soils samples were taken at various depths to help categorise the spoil and determine appropriate waste routes. The sampling focussed on organic contaminants (BTEX, PAHs, TPH, etc) and leachate testing.

Details of the borehole and lab results are included in the Socotec report *Main Gate Lighting GI* (Report No F2020-22).

The borehole log indicates that there is around 1.5m of made ground (tarmac overlying a sub-base of gravels, cobbles and sand) above various glaciofluvial deposits, the borehole was drilled to 10.15mbgl and did not reach bedrock. No water strikes were recorded.

The results of the soil sampling, shown on the Socotec lab report, indicate that elevated levels of TPH (Total Petroleum Hydrocarbons) and PAHs (Polycyclic Aromatic Hydrocarbons) were measured in the two shallowest samples from 0.05mbgl and 0.20mbgl. Both of these shallow samples are recorded by the lab as being tarmac, so elevated levels of PAHs are to be expected and TPH is likely to be found due to the heavy traffic the bus lanes experience.

No elevated levels of contamination were picked up in the deeper samples (from 0.80mbgl to 8.60mbgl) indicating that PAHs and TPH are limited to the tarmac surface and tarmac fragments within the made ground, and have not migrated to affect deeper sediments or groundwater.

6. Excavation Process

All groundworks and excavations on Sellafield are carried out under the *Sellafield Site Instruction – Excavations and Ground Disturbance* (SSI 3.02.227). As part of the process permission to excavate must be obtained from the Sellafield Contaminated Land Manager, the local Waste Advisor and Service owners.

While this process does not require a full site investigation it does ensure that known or potential radiological and chemotoxic contamination is flagged up before groundworks can start and appropriate mitigation measures can be put in place. In addition, the permission document requires work to halt, and the Contaminated Land Manager be informed should any unexpected contamination be encountered during the excavation.

7. Conclusions

The review of historic data for the development area has not highlighted any land use that may have led to contamination beyond what would be typically expected on a highway with vehicle movements. The aerial photos show that the since the construction of the Royal Ordnance Factory the land has just been used as the main access to the site with associated bus lanes, vehicle inspection bays and drop off points. The events and incidents databases have no records of potential contamination in this area.

The groundwater sampling does not show any significant radiological contamination and the soil sampling only shows elevated PAHs and TPH in the surface tarmac as would be expected. No elevated levels of contamination were observed in deeper made ground or natural deposits.

Given the above there is no evidence of a significant risk of contamination impacting either groundwater or human health. As such it is felt that no further contaminated land site investigation is required for the development to proceed.

As the proposal does include piling that may go into groundwater it is recommended that a Piling Groundwater Risk Assessment is carried out following the guidance given in the document *Piling into Contaminated Sites* (Environment Agency, 2002). In this case the tarmac should be removed before piling to ensure that material containing elevated PAHs is not driven into deeper ground or groundwater, and the lighting column installed to ensure that the pile cannot act as a fast contaminant pathway in the event of future leaks or spills nearby.

8. References

- Guidelines for Drinking Water Quality 4th Edition (World Health Organisation, 2017)
- Main Gate Lighting GI (Report No F2020-22) (Socotec, 2022)
- SSI 3.02.227 – Sellafield Site Instruction: Excavations and Ground Disturbance (Sellafield, 2022)
- Piling into contaminated sites (Environment Agency, 2002)