

Retention of a Three Storey Modular Building 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 planning application for the continuing use of the Three Storey Modular Building at the north end of the Sellafield site. The development includes:

- An existing Three Storey Modular Building installed in 2022.

The location of the building in the northern part of the Sellafield site is shown in Figure 1, please see the combined Planning, Design and Access Statement for full details.



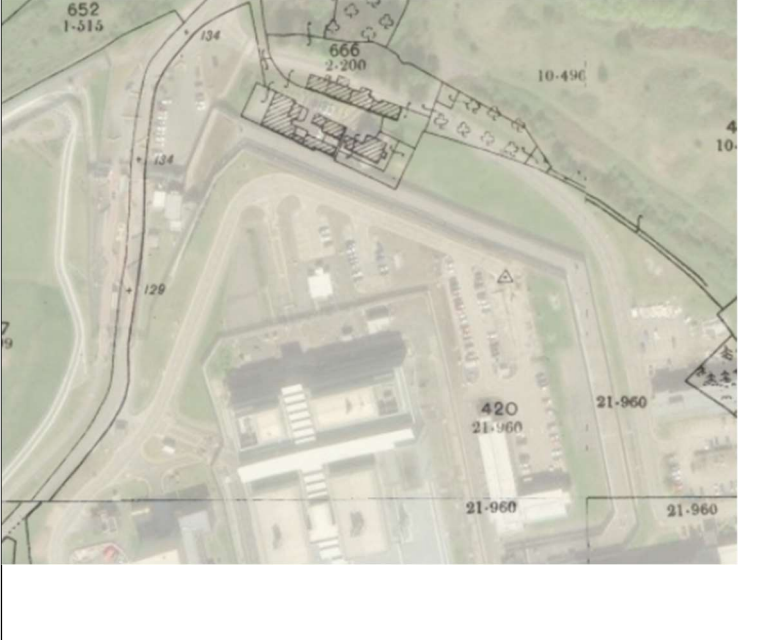

Figure 1. Location of the Three Storey Modular Building marked by a red boundary.




As the building is already in place and connected to services there will be no further excavations or groundworks. However, 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. 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 potential risk of land contamination.

2. Area and Building History

The history of the area around the Three Storey Modular Building is reviewed below with reference to historic maps and aerial photos.

Year		Comments
c. 1900		<p>Before the development of Sellafeld the site was farmland, and the buildings area was within a field with the farm buildings and houses of Yottenfews to the north west. NB. The aerial image was taken before the buildings were in place.</p>
1946		<p>In the 1940s the Royal Ordnance Factory was built on what is now the central Sellafeld site approx. 800m to the south. The area around the buildings remained as farmland.</p>

1968		By the late 1960s the wider Sellafield site was well developed and the North Group buildings were present, approx. 200m south of the cabin location. The area of the buildings was still farmland with the Yottenfews buildings visible to the top left of the photo.
1983		By the early 1980s the North Group area had been further developed. The site of the buildings remained as a grassed area but was no longer used as pasture.
1989		In 1989 the site of the buildings had been developed into a small car park.

1999





In the late 1990s the area underwent extensive development during the construction of the central lab building. The site of the buildings was part of the construction compound and laydown area.

2005



Following the development of the central lab the site of the buildings was reinstated as a larger carpark.

2017		In 2017 the local site roads were repositioned and the car park reduced in size to allow for the new perimeter security fence to be installed.
2023		By 2023 the Three Storey Modular Building were installed on the site of the car park.

The above images show that the site of the buildings remained undeveloped until the late 1980s when it became a car park. It remained in this use until the installation of the buildings in 2022, apart from a period during the construction of the central lab when it was used as a construction compound and laydown area.

Not picked up on the images is an offsite landfill approximately 60m to the north of the buildings. This area of landfill is known as the North Tip Extension and was filled between 1997 and 1998 with rock and soil from development of the Box Encapsulation Plant and the Central Lab. The work was carried out under Waste Management Licence No. 57301 which required all deposited material to be inert. Landfill gas monitoring was carried out using 49 shallow probes across the landfill site, the Closure and Aftercare Management Plan from 2014

recorded that all recent monitoring was below the background levels of ground gas measured before the waste was deposited.

3. Records of Incidents and Potential Contamination Sources

Throughout its history Sellafield has kept records of incidents and events, such as leaks, spills and 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 immediate area of the building.

The nearest recorded incidents to the buildings are several finds of asbestos cement material (ACM) in the made ground during excavations to the west and south. ACM finds in made ground are common across the Sellafield site and these incidents are not expected to have any impact on the planning application or future use of the buildings.

4. Nearby boreholes and soil samples

Sellafield has a large number of boreholes that are part of the groundwater well monitoring network. Using this network, the groundwater across site is regularly monitored to ensure environmental compliance and to track and monitor contamination. Data from the monitoring network shows that the general groundwater flow is to the southwest from the fells towards the coast.

There are a limited number of groundwater monitoring boreholes in the northern part of the site due to its lower risk of radiological contamination and a lack of active facilities up hydraulic gradient. The nearest borehole (6964) is located approximately 30m to the east of the Three Storey Modular Building close to the licence site boundary. The well was installed in 2005 and groundwater samples have been taken regularly. Table 1 shows the Total Alpha and Beta levels recorded in the groundwater over the past 3 years. This data is taken from LQDMS (Land Quality Data Management System).

Table 1. Total Alpha and Beta in groundwater from nearby borehole (6964)

Date sampled	Total Alpha (Bq/l)	Total Beta (Bq/l)
08/04/2022	0.016	0.251
25/11/2022	0.018	0.338
21/06/2023	0.012	0.460
24/10/2023	0.012	0.256
23/09/2024	0.078	0.418
23/10/2024	0.027	0.256

The borehole was drilled to a depth of 30mbgl (metres below ground level) and encountered 0.70m of made ground comprising fine clays and sands. The made ground overlies natural sands and gravels, and weathered sandstone bedrock is recorded at 3.40mbgl. Dipping rounds indicated that groundwater is approximately 21mbgl.

In 2007 a single soil sample was taken to the immediate west of the buildings site to aid spoil disposal for a new smoking shelter. Both radiological and chemical analysis was carried. Table 2 shows the Gross Alpha and Beta levels recorded in the sample, the levels recorded allowed for unrestricted release and offsite disposal at the time.

Table 2. Gross Alpha and Beta in soils from smoking shelter excavation (excluding 2 sd uncertainties)

Depth (mbgl)	Gross Alpha as Pu-239 (Bq/kg)	Gross Beta as K-40 (Bq/kg)
0.2 – 1.0	520	644

Other spoil from this part of site has been previously characterised as Out of Scope (exempt) in radiological classification.

The chemical analysis included metals and a variety of organic compounds including PAHs, petroleum hydrocarbons, PCBs, etc. The results of this analysis did not highlight any elevated levels of contaminants. All the metals were within normal ranges and below generic assessment criteria, while the organic compounds were below the limit of detection or well within normal ranges. This was a shallow sample from a small excavation but it indicates that the made ground here was not significantly contaminated.

Spoil from this part of the site has been previously characterised as Non-Hazardous for disposal purposes.

5. 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 the excavation 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.

No excavation work is required as part of the planning application but all previous excavation required for the installation of the Three Storey Modular Building were carried out under this process.

6. Conclusions & Recommendations

The review of historic data for the development area has not highlighted any known contamination. The aerial photos show relatively small amounts of development in this part of the Sellafield site. Prior to the installation of the Three Storey Modular Building the only land use was pasture, car parking and a construction compound during the development of the Central Lab. The events and incidents databases have no records of potential contaminative events in this area beyond some asbestos containing material found in the made ground in nearby excavations.

The area to the north and offsite is the location of the closed North Tip Extension landfill. Only inert waste was deposited in the landfill and subsequent landfill gas monitoring was below the background levels recorded before the waste was deposited.

The groundwater samples from the nearby borehole and the soil samples from the smoking shelter excavation do not show unusual levels of radiological contamination and the chemical analysis does not show elevated levels of metals or organic compounds in the shallow made ground.

Given the above there is no evidence of a significant risk of contamination impacting either groundwater or human health. As such land contamination should not be a pertinent factor in determining the planning application.

7. References

- SSI 3.02.227 – Sellafield Site Instruction: Excavations and Ground Disturbance (Sellafield, 2022)
- Closure and Aftercare Management Plan for North Tip Extension Landfill Site (The Arley Consulting Company Ltd, April 2014)