

4. Alternatives and Design Evolution

Environmental Appraisal
Volume I

4. ALTERNATIVES AND DESIGN EVOLUTION

4.1 Introduction

This chapter of the Environmental Appraisal (EA) outlines the details of the design evolution which was undertaken in relation to the proposed High Explosives Fabrication Facility (HEFF) development. It outlines the alternatives that were considered, and describes the considerations that affected the development of the design. This chapter has been written by the HEFF Project Team.

4.2 The Overall Approach to AWE Aldermaston

In 2002, AWE produced a Site Development Strategy Plan (SDSP) (Ref. 4-1) which detailed the proposals for the future of the AWE sites. It was intended that all activity was to transfer from Burghfield to Aldermaston with the ultimate aim that the Burghfield site would close.

In July 2005 the Secretary of State for Defence announced a three-year programme of investment into the facilities at AWE with the aim of refurbishing and replacing facilities that were principally constructed in the 1950s and 1960s. It had by now become apparent that it would not be possible to close the Burghfield site for operational reasons, and a Site Development Context Plan (SDCP) (Ref. 4-2) and associated Illustrated Framework Plan were produced to describe the approach to the development of both the AWE Aldermaston and Burghfield sites. The key aims of this approach were stated as:

- To improve the standards of design;
- To enhance the environmental performance;
- To reduce the environmental impact;
- To manage traffic; and
- To maximise the benefits to the community.

The Aldermaston site can be split into three broad areas (Extract from AWE SDCP, Figure 4-1). The north western part of site is devoted to the nuclear aspects of the AWE business, the south western part of site accommodates the vast majority of the existing office accommodation, and the eastern part of site is principally devoted to the conventional explosives aspects of the business. For a variety of operational and practical reasons, there is considerable advantage in retaining this split, and future developments will seek to reinforce these distinctions. The SDCP describes in more detail the approach to each of these areas.

One of the proposals of the SDCP is that all conventional explosive related activity is to be consolidated at the Aldermaston site within the existing explosives area. This entails transferring a number of activities that currently take place at Burghfield over to the Aldermaston site. The integration of all these activities will bring about considerable advantages, not least a decrease in the number of transport movements between the two sites of explosives and personnel. The

overall aim is to place facilities with the largest potential explosives inventory in the centre of the licensed site and facilities with smaller inventories on the periphery.

Figure 4-1 HEFF development in the overall context of AWE Aldermaston (Extract from Site Development Context Plan)



Under the proposals of the SDCP, previously developed or "brownfield" sites are to be re-used in accordance with one of the major themes of Government Policy. Any development at AWE must be undertaken without adversely affecting existing operations on the sites and, most importantly without compromising safety and security. All development will be carried out in the context of the nuclear site licences and other stringent controls.

4.3 High Explosives Fabrication

High explosives fabrication is currently carried out in approximately 24 buildings spread across the explosives areas at both Aldermaston and Burghfield, with the vast majority of the facilities originating from the 1950s. It was recognised that the current facilities did not meet AWE's needs because:

- The 1950s vintage buildings had become extremely maintenance intensive and were in need of major refurbishment to secure their future;
- The split in location of the facilities at both Aldermaston and Burghfield caused an inefficient and dispersed manufacturing process; and
- Modern regulatory requirements had imposed restrictions upon the operation of the facilities that meant that they were not able to meet the production demands.

This, combined with the overall vision of combining all explosives facilities at Aldermaston meant that a new approach was necessary. A new solution for high explosives fabrication was required that would provide an enduring, reliable and cost effective fabrication facility with sufficient capacity and flexibility to meet the production demands. The options which have been considered are discussed in section 4.4.

4.4 Options Considered

The broad options considered include:

- Do nothing;
- Outsource the work;
- Refurbishment of existing facilities;
- New build at various locations; and
- New build at one consolidated location.

4.4.1 Do Nothing

The option was eliminated due to the poor condition of the existing buildings which are inefficient and would require intensive maintenance. It would be not technically feasible and would also not be in the interest of safety. The do-nothing option therefore cannot ensure the long-term provision of an explosives fabrication capability required by the MoD.

4.4.2 Outsource the Facilities

The option to outsource was discounted at the first stage. Due to the sensitive nature of the processes involved, it was deemed not in the interests of national security to outsource the work offsite.

4.4.3 Refurbishment of Existing Facilities

Although refurbishing existing facilities would have the lower initial capital cost, it was observed that the whole life costs would be greater than new build over the life of the facilities due to continuing maintenance needs. In addition, there was also the risk that unforeseen structural problems within existing facilities might be revealed leading to higher costs than those predicted. The key decision lay in the fact that the refurbishment of existing facilities did not solve the fundamental problem of dispersed operations and the transportation of material between the two sites.

4.4.4 New Build at Various Locations within AWE Aldermaston

This option involved replacing each existing facility with a number of replacement new build facilities. The SDCP highlighted the benefits of locating the facilities within the Aldermaston site hence Burghfield was not considered.

One of the major inefficiencies and safety concerns with current explosive fabrication operations is the fact that explosives are moved between different buildings. The time required to prepare explosives for external movements and unpack them afterwards slows the process down and is labour intensive. Also, more importantly, with every moment that the explosives are outside, there is a greater risk of an incident that could lead to harm.

For these fundamental reasons, it was concluded that this option was not viable.

4.4.5 New Build at One Consolidated Site

This option would enable the existing facilities to be completely replaced by an efficient purpose built facility at one location, within the Aldermaston site. This was chosen as the preferred option as it adhered to three key criteria:

- Replaced out of date facilities across Aldermaston and Burghfield;
- Consolidated all explosive related activity in one purpose built facility (as proposed in the SDCP); and
- Would enable future production demands to be met.

Due to key operation and safety requirements, a single new-build facility within the explosives area at Aldermaston emerged as the clear option to take forward into the design phase. The benefits of this option included:

- Having operations within a single facility will reduce the number of explosive material movements between buildings, thus reducing risk and enhancing the efficiency of the current fabrication processes;

- Energy savings will be realised in the long term by providing a single modern, energy efficient replacement facility;

- Facility operators' safety and working conditions will be improved;
- Operational waste arisings will be reduced through improved processes;
- The capability provided by AWE will be maintained in a more sustainable way for the foreseeable future; and
- Future decommissioning will release brownfield sites for possible future re-use or development.

4.5 Siting Considerations

One of the key aims of the SDCP is to consolidate all explosives related activity from both Aldermaston and Burghfield in the eastern part of the Aldermaston site within the existing explosives area. A number of possible sites for the HEFF facility were considered and evaluated.

The overriding consideration in selecting the location of the HEFF was safety. Although separated within separate blast containment cells, the total inventory for the facility is relatively large. It was decided therefore to place the new facility as far from the perimeter of the explosives area and other buildings as possible. The option study lead to the selection of the most suitable site for the facility to be located at the centre of the explosives area (Figure 4-1).

4.6 Design Evolution

The final design of the facility has been developed with the following seven key drivers:

- Functional requirements of the UK explosives regulator within the Health and Safety Executive (HSE);
- To create a working environment that facilitates business effectiveness and efficiency;
- To provide a more modern working environment for staff in order to retain and attract staff;
- To contribute to an improved image and character of AWE towards a "Science and Technology Park";
- To work towards the Government's aims to make sites and buildings more sustainable;
- The requirements of the BREEM assessment undertaken as part of the design evolution process; and
- Requirements of a Sustainable Urban Drainage System (SUDS).

The design of the facility began with an initial concept design. The initial concept was to have cells either side of a connecting corridor and this has remained throughout the duration of the project. The design has been influenced by:

- observing how a similar facility in the USA works;
- undertaking a series of design reviews;
- applying site architectural design standards and principles; and
- ensuring the operational requirements of the Proposed Facility are accommodated.

Undertaking a number of sustainability appraisals has also influenced the design. This has therefore culminated in a facility design which will perform the tasks required of it efficiently and effectively.

The Existing operations have resulted in the present day operational staff working in relatively isolated conditions. By linking the process and support buildings, and thus improving ease of access, a vastly improved working environment will be provided.

The external design is consistent with the AWE "Site and Architectural Design Principles" (Ref. 4-2) and as such will help to develop the "Science and Technology Park" feel that the company is aiming for.

Safety and security requirements are paramount in the design of this facility. These requirements have been met without compromising the ability to design a facility that is also considerate to the environment whilst maintaining a modern, efficient, safe, secure and comfortable working environment that will benefit society as a whole.

4.7 References

Ref. 4-1 AWE (2005) Aldermaston & Burghfield Site Development Context Plan (SDCP) 2005-2015

Ref. 4-2 AWE Site and Architectural Design Principles (2003)

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