6. Construction Phase

Environmental Appraisal
Volume I

6. CONSTRUCTION PHASE

6.1 Introduction

This chapter of the Environmental Appraisal (EA) describes the activities associated with the construction of the High Explosives Fabrication Facility (HEFF) project. The construction phase consists of three distinct periods – the first is the formation of a construction enclave to surround and support construction activities, the second is the construction of the Proposed Facility (as described in *Chapter 5: The Proposed Development)* and the third is the testing and commissioning phase once the facility is built. This chapter has been written by the HEFF Project Team.

6.2 Programme of Works

It is envisaged that the whole scheme will take approximately 43.5 months to complete, which includes up of 8.5 months for the completion of the construction enclave, 24 months for the construction of the Proposed Facility and 14 months of testing and commissioning (including 5 month overlap with construction phase). A programme is given in Figure 6-1 giving estimated durations for the key construction periods and each of these is described in more detail in section 6.4.

6.3 Description of Proposed Works

6.3.1 Key Elements of the Construction works

The construction phase can be split into three key elements which are briefly summarised here (for more detailed descriptions refer to *Chapter 5: The Proposed Development*):

1. *Temporary Construction Enclave* - a fenced area for use during the construction period enclosing construction activity, access to the development from the highway, car parking, office and welfare accommodation for construction workers, laydown areas and security posts. All of these areas will be fenced off to form a totally separate construction enclave from the main AWE site.
2. *The construction of the Proposed Facility* – this includes the main HEFF Process and Support building and the Mechanical and Electrical building.
3. *Testing and Commissioning.*

6.3.2 Temporary Construction Enclave

Before the start of the main works, a fence will be placed around the whole construction site and access routes to the construction site to enclose all construction activities and separate them from other AWE operations. The construction enclave links up three separate elements:

- Construction site;
- Contractors compound; and
- Contractors compound overflow.

The Central Area Construction Enclave (CACE) will enclose the main HEFF construction site, and both the contractors compound and contractors compound overflow. Access to the CACE will be through the West Gate. The project will create a temporary construction access road from Griffin Road through the construction site. This road will be built up from ground level so excavation will be limited to a surface scrape of topsoil or loose ground, and will be of either flexible pavement or concrete slab construction (for the construction material estimate table (Figure 6-3), a flexible pavement has been assumed). French drains will be provided along the length of the road. The project will also create temporary connections to utilities for construction use, and will install security and welfare cabins. Some improvements will be made to existing roads, mainly associated with separating construction traffic and AWE traffic along Griffin Road.

The Construction Enclave project will create a construction site area for HEFF of 60,500 m^2, a separate laydown area and office and welfare compound of 9,250 m^2. Partial use will be made of the 15,600 m^2 of car parking that is to be provided at the West End Construction Enclave by the NOA development.

6.3.3 Enabling Works and Mobilisation

Once the Construction Enclave is complete, the main Contractor will mobilise. Enabling works to take place in this period include the creation of areas of hard standing for laydown and re-fuelling, installation of a wheelwash, construction of site roads, and installation of cabins to form the office and welfare accommodation and the works control centre.

There will be no demolition activity necessary for the Proposed Development, but around 50 trees will need to be removed. These will be felled outside of bird nesting season, and will also be checked for bat roosts prior to felling. Trees will be replanted at a ratio of at least three trees to every one removed and will be located both inside and outside of the Project site boundary (See Figure 5-1).

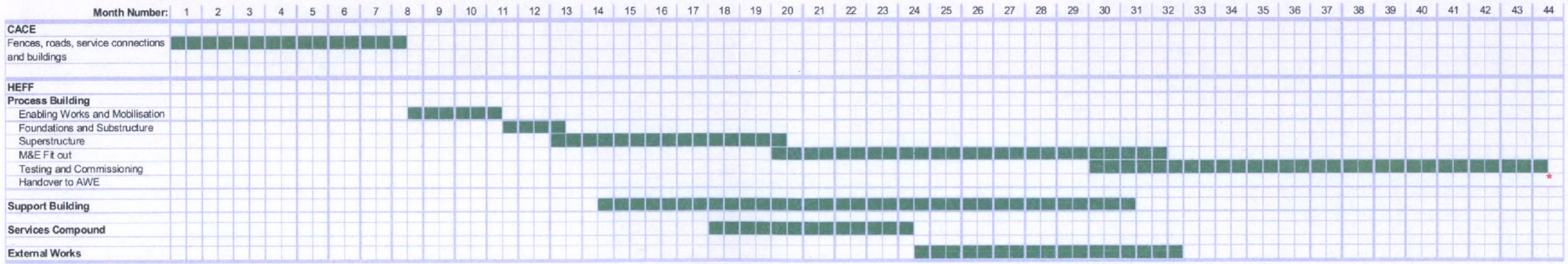
6.3.4 Main Works

6.3.4.1 Foundations and Substructure

The buildings are to be founded upon compacted natural ground (Silchester Gravels), using ground bearing reinforced concrete raft foundations. Surplus topsoil and bulk materials created during the excavation of the foundations will be stored in a mound within the development boundary and grassed over in a designated spoil storage area during construction. All stored spoil will be used within the landscaping of the site at the end of construction. Construction of the base slab will commence from the wall adjacent to the Support building to the building access (at the process end of the building). A power float finish to the slab will necessitate a limited night shift in this period. Noise will be managed in accordance with the AWE Code of Construction Practice.

Foundation levels have been designed to lie above anticipated mean ground water levels, although limited pumping of groundwater (maximum discharge of 5l/s to foul sewer)and surface water run off will be required. A pit of approximately 2.4m deep is required to house equipment; this will require a localised cut off with a sheet piled enclosure. There will be suitable discharge points for groundwater, which will have been pumped out of excavations via a settlement tank. Advance chemical testing of the groundwater has already been carried out in site investigations and these have confirmed suitability for discharge – although quality levels will continue to be monitored.

Figure 6-1 Construction Programme



The lightning towers and traverse walls will have reinforced concrete foundations.

All construction work will be carried out in accordance with Health and Safety Regulations, and AWE's Code of Construction Practice. A suite of construction safety documents (including a Construction Management Plan (CMP)) has been prepared by the Contractor detailing construction safety planning completed to date, and they will continue to be updated through the development of the building design into construction.

6.3.4.2 Superstructure

The main building superstructure will be constructed in reinforced concrete. Once the base slab is 60% complete, the concrete pouring of the walls of the process building will commence, beginning at the support building end. A flat, reinforced concrete roof will complete the structure, with the curve of the roof constructed of a clad steel frame which will sit on top of the concrete roof. Prefabrication of the concrete structure and roof frame will be used wherever the design allows.

6.3.4.3 Mechanical and Electrical Fit-Out

The next stage of construction will be to build the mezzanine floors and complete the internal finishes. The mezzanine levels are to be steel framed and will be prefabricated wherever practicable. Once the mezzanine floors are complete, installation of mechanical and electrical services will begin along with installation of process plant.

6.3.4.4 Support Building and Services Compound

Both the support building adjacent to the process building and the services compound will be of similar appearance to the larger main process building. They will be founded upon ground bearing reinforced concrete slabs, with a steel frame and precast concrete/ blockwork infill panels between main steel columns.Curved steel roof members will provide support for the architectural roof cladding detail. Similar cladding to that used on the main building will also be used.

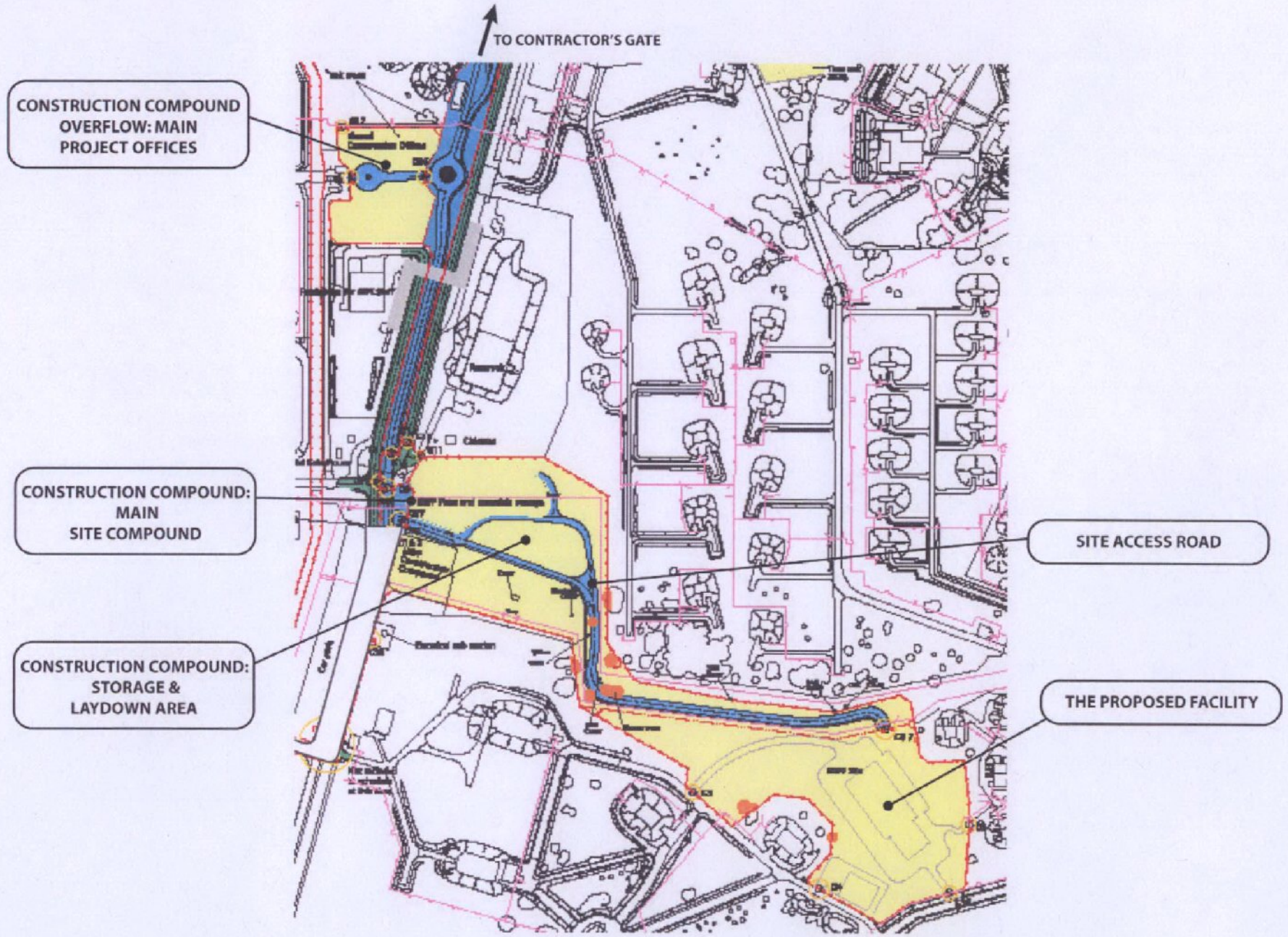
6.3.4.5 External Works

The final activities will be the construction of the concrete traverse walls, landscaping, and the installation of permanent fencing and permanent access roads. At this point, any spoil removed during excavations will be re-used within the landscaping and the traverse wall mounds.

6.3.5 Testing and Commissioning

Once all buildings are nearing completion, their testing and commissioning will commence. This is a necessarily lengthy period of the programme as the safety design has to be demonstrated; although once this period is well underway, all other construction activity will have been completed. During this period vehicle movements will be relatively low (20 per day during the peak). In addition, this activity does not require use of the construction enclave.

Figure 6-2 Construction Access Routes within Site



6.4 Materials and Resource Use

Extensive planning will take place in advance of construction in order to reduce the amount of materials used, and reduce the number of deliveries to site. This will be achieved by a number of methods such as using modularising components as far as is practically possible and maximising loads on deliveries. Resources will also be planned to ensure continuity of each resource on site until all works are completed (for example, cranes and excavators will be on site for one visit only, completing all works necessary until they are removed from site).

Benefits of this advanced planning will be seen in improved safety on site, minimisation of deliveries to site and minimal disruption to the surrounding area.

Table 6-1 gives quantity of each material used at each stage, and describes the method employed to reduce deliveries to site. Figure 6-3 details the items of major and minor plant that are to be used.

Table 6-1 Key Construction Material Estimates

Material	Used For	Quantity Estimate	Number of Deliveries Required	Method of reducing deliveries to site
Concrete	Reinforced concrete works, roads, services	9000m^3 required	Deliveries to be in mixer trucks of either 6m^3 or 8m^3 capacity. Approximately 1650 separate deliveries.	• Local suppliers to be sourced. • Design pour layouts to avoid part loads • Wastage from pump lines and wash out allowed to set and broken up for use on site haulage roads • Use 8m^3 trucks where possible • Use pre-cast solutions wherever possible
Reinforcing steel	Reinforced concrete works only	1000 tonnes estimated	Can be delivered in pre-made cages on vehicles with 20 tonnes maximum limit – this gives 60 separate deliveries	• Maximise loads on single deliveries • Design to minimise required quantities wherever possible
Scaffolding	Reinforced concrete and building work	-	Initial deliveries to site on flat bed lorries. Estimated 40 deliveries to / from site.	• Maximise load on single deliveries • Maximise reuse of scaffold on site • Keep to one contractor on site providing scaffold
Road Materials / Aggregates – HEFF facility	Earthworks and road paving	6000 tonnes estimated	300 deliveries estimated.	• Maximise load on deliveries
Road Materials / Aggregates – CACE	Construction access roads	6400 m^3 estimated	Approximately 700 deliveries	• Maximise load on deliveries
Formwork	Reinforced concrete works only	-	Wall shutters, ply forms, ties, props etc. can be delivered on flat bed lorries up to 20T load - estimated 40 deliveries to bring in and out	• Maintain cleanliness and good practice to maximise re-use of forms • Maximise load on deliveries
Falsework	Reinforced concrete works only	-	Support frames for suspended slabs. Emphasis on bringing all requirements in one or two visits – estimated 40 deliveries to bring in and out	• Allow for maximum strike/ re-erect permissible in programme • Maximise load to site
Structural steelwork and cladding	Steel erection and cladding works	-	30 deliveries estimated	• Maximise load on deliveries • Off cuts and pallets taken back with subsequent deliveries • Efficiency of design through constructability review
Blockwork	Block wall construction	800 tonnes estimated	To be delivered on 20T flat bed lorries – 40 deliveries estimated	• Maximise load on deliveries • Delivery lorries to remove old packaging/ pallets before leaving site • Off cuts may be broken down for hard standing in temporary roads • Use of mortar silos reduces numbers of pre-mix mortar deliveries to site
Dry lining	Dry lining works	-	Lightweight but typically bulky	• Maximise load on deliveries • Delivery lorries to remove old packaging/ pallets before leaving site • Delivery lorries to remove off cuts of dry lining for recycling purposes
Pipework and services	Groundworks and installations	-	Tend to be delivered on flat bed lorries and bundled with formers – approx 90 vehicle movements	• Maximise load on deliveries • Prefabricate units wherever possible
Spoil arisings	Soil excavated during groundworks	2500 m^3	None – all to remain on site for reuse.	

Figure 6-3 Items of Plant

Plant item	Used for	Fuel type	Resident / visiting	Number required
MAJOR ITEMS OF PLANT				
20T Excavator	Bulk earthworks and road construction	Diesel	R	1
JCB Backhoe	Buried services	Diesel	R	1
5T Dumper	All earthworks	Diesel	R	1
Bomag Vibro roller	Roads and earthworks compaction	Diesel	R	1
90TE Crawler Crane	RC, cladding and building works	Diesel	R	Max of 2
Concrete pump	RC works	Diesel	V	Max of 2
Concrete mixer trucks	RC works	Diesel	V	Up to 6
All terrain telehandler	All site works	Diesel	R	1
All terrain scissor lift	Cladding	Diesel	R	2
All terrain cherry picker	Cladding	Diesel	R	1
Compressor	RC works	Diesel	R	2
Diesel generator	Initial site set up – occasional use during works e.g. welding	Diesel	R	1
MINOR ITEMS OF PLANT				
Concrete vibrators	Concrete compaction	Air	R	6 max
Electric hand tools (saws, drills, light breakers, screwdrivers, grout paddles, impact wrenches etc.)	All general works	110v	R	30 – 50 max
Welding plant	RC works and plant installation	415v	R	3 max
Power floater	RC Slab finishes	Petrol	R	2 max
Hoists/ winches	Plant installation	110v/ 415v	R	4 max
Grout pump	Floor screeding	415v	R	1
Cement mixers	Blockwork / plastering	110v	R	3 max

6.5 Hours of Work

Access to the site and construction activities will be in accordance with AWE's Code of Construction Practice, including the management of any required night time operations. Normal working hours will be 07:00 to 19:00 on weekdays and 07:00 to 16:00 on Saturdays (when required).

6.6 Traffic

6.6.1 Construction Phase Traffic

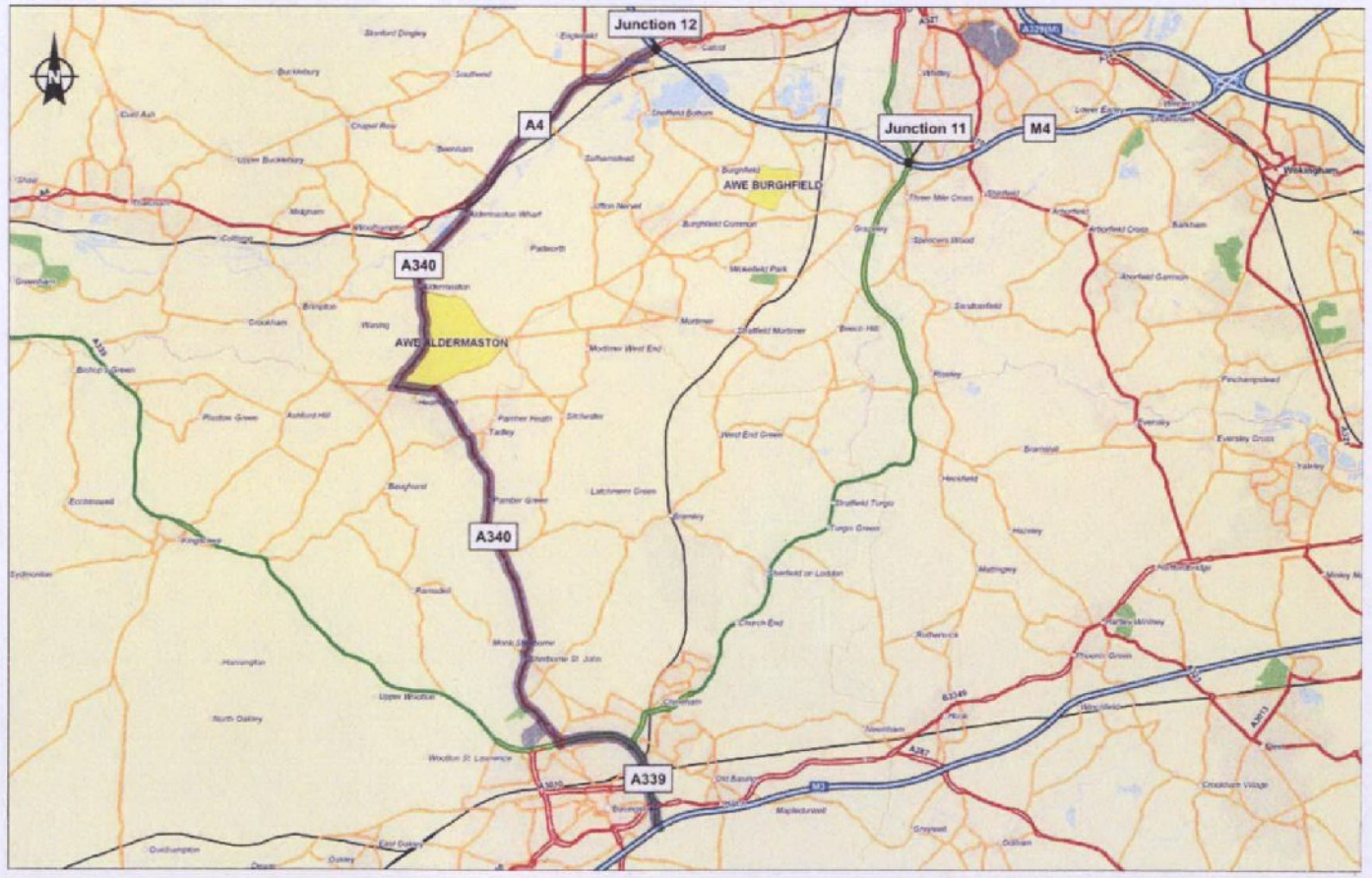
A dedicated Construction Phase Traffic Management Plan has been set up to safely and effectively manage traffic. The main aims of the plan are to segregate vehicles and personnel, minimise the number of vehicles brought on to site and make sure that all parties are aware of the traffic arrangements. The benefits of the careful management of traffic will be as follows:

- Reducing disturbance to the local community;
- Reducing the impact on other AWE operations;
- Improving the ability to comply with security arrangements;
- Reducing environmental impacts, especially overall exhaust emissions;
- Reducing Health and Safety risks; and
- Bringing financial benefit to the project with reduced delivery costs.

6.6.2 Traffic Routing Plan

The AWE site is located just off the A340 in Aldermaston near Reading in Berkshire. The nearest motorway junction is junction 12 of the M4. Figure 6-5 shows routes to site from the North and South. The preferred route (as shown in purple on Figure 6-5) is via the A4 to the North of the site, passing south through Aldermaston Village before turning left into the site at the West Gate for car parking or vehicle marshalling, and it is assumed that there will be a 70:30 north:south split. Vehicles will only be permitted to directly access the contractor's gate from the A340 in special circumstances (such as concrete wagons). A local traffic map showing all existing height, weight, width and other restrictions will be developed.

Figure 6-4 Routes to the Site



6.6.3 Access and Delivery

6.6.3.1 Personal Vehicles

All personal vehicles will enter the AWE site at the West Gate. Vehicles will be parked at the west end car park and initial security checks will be made. Personnel will then be taken by coach along the internal link road into the Central Enclave. A security post will be placed on Griffin Road, and once security checks are complete, personnel will be taken either to the Site Establishment reception, or the HEFF construction site Works Control Centre (WCC).

Measures will be taken to minimise the numbers of personal vehicles travelling to site. All personnel will be encouraged as far as possible to practice car sharing, pick-ups from local train stations will be employed, and cycling encouraged to reduce the numbers of personnel vehicles requiring parking at the West Gate (space will be reserved for 70 cars only). A minibus service will transport the workers from the car park to the construction enclave.

6.6.3.2 Delivery Vehicles

All delivery vehicles will enter the AWE site at the West Gate, with the exception of special deliveries, which will go straight to the entrance to the Central Enclave at the A340 Contractor's Gate. Vehicles will then be escorted through the Central Enclave, taken straight to the WCC then on to the delivery location. Upon exit, vehicles will leave by the A340 Contractor's Gate (see Figure 6-2).

6.6.4 Vehicle Movements

The West End car park is to provide 70 spaces for the use of HEFF construction workers, and five further spaces are to be provided within the welfare area for key staff, and emergency response vehicles. Assuming that these are fully utilised, this indicates there will be a peak of 150 construction worker vehicle movements per day.

The construction worker car park was granted planning approval in January 2007, as part of the New Office Accommodation (NOA) planning application. The use was conditional upon its restoration to a sports playing field at the end of construction activities. Construction activities of both projects will occur for a proportion of the same time.

Average and peak HGV movements per day for the duration of the project are given in Figure 6-5. In terms of delivery vans, there are expected to be an average of 5 per day (and thus 10 vehicle movements), with no unusually high peaks anticipated.

No spoil is to be taken off site; all spoil arising from excavation will be reused within the final landscaping of the site.

No abnormal loads are anticipated, although it may be found that the crawler cranes require a police escort; in this event, a maximum of four vehicle movements will require escorting.

Figure 6-5 Average and Peak HGV Movements