CHAPTER 9: DETAILED DESIGN AND CONSTRUCTION

ISSUES

THE CASE FOR THE APPLICANTS

Introduction

9.1.1 The functional design requirements for the project can be summarised as follows:

- The construction of a 400kV double circuit overhead line from Beauly to Denny with one circuit operating at 275kV initially.
- The new circuits to be routed via Fasnakyle, Fort Augustus, Errochty and Braco substations.
- The existing 275/132kV substation at Beauly to be reconfigured to 400/275/132kV.
- The existing 132kV substation at Fasnakyle to be reconfigured to 275kV.
- The existing 132kV substation at Fort Augustus to be reconfigured to 400/275/132kV.
- The existing 132kV substation at Errochty to be reconfigured to 275/132kV.
- A new 275kV substation to replace the existing 132kV substation at Braco.
- The construction of a new 400kV substation at Denny.

Line design considerations

9.1.2 Potential impact on landscape and visual amenity is inherent in an extra high voltage overhead line but balancing the number of towers against the height of towers can mitigate this. Simply reducing the height of the towers would require an increase in the number of towers required in order to maintain ground clearance. In addition, towers with smaller dimensions around the conductors would not perform adequately at higher altitude.

9.1.3 PB Power was asked to compare a number of alternative conductor arrangements as explained in APL 6/11. The conductor configuration adopted was two 700mm² All Aluminium Alloy Conductors (AAAC) (twin Araucaria). Based on the values of electric fields, magnetic fields, audible noise and radio interference which would result from the adoption of this configuration on the proposed towers, PB Power recommended an increase in ground clearance of the conductors from 7.6m to 7.8m. This has been adopted by Balfour Beatty Power Networks Ltd (BBPN), who were appointed in early 2004 as the line design contractor for the project, in plotting instructions (APL 6/7) used to position towers along the route.

Tower design

SHETL towers

9.1.4 Following the identification of the proposed route for the line SHETL considered the type of tower to be employed in their area. The vast majority of
towers employed in the UK are steel lattice structures and SHETL concluded that lattice towers provided the best all round solution.

9.1.5 The Electricity Safety, Quality and Continuity of Supply Regulations 2002 require overhead electricity lines to be “fit for purpose” which means that they have to be able to withstand the likely worst climatic loading in the locations where they are to be operated. Overhead lines must be designed to meet the requirements of British Standard BS EN 50341-1:2001 “Overhead Electrical Lines Exceeding 45kV”. Balfour Beatty Power Networks Ltd (BBPNL) was required to carry out full design studies to identify suitable tower/conductor combinations for use in the project.

9.1.6 BS EN50341-1 allows different levels of reliability to be allocated to a line and its towers. Reliability is set by a load factor. Increasing the load factor makes it less likely that an extreme event (e.g. of wind or ice) will occur over a long period of time that is likely to exceed the strength of components. The selected reliability, level 2, conforms to that recommended for 275/400kV structures in open country and for normal security. It is equivalent to a 1 in 150 year event with a gust wind speed of 170mph, which is only likely to occur at altitude. Additional security would be provided to reliability level 3 at significant road and rail crossings and in areas of significant habitation.

9.1.7 The level of reliability through the line is achieved by setting limits on the span of conductor that can be supported by any tower at a given altitude. These are summarised in the Project Specification (APL 6/3 and 6/4) and applied to the line profile when positioning each tower using the plotting instructions. Moving one tower in the line is likely to require some adjustments to adjacent towers and may involve a height increase to one or more towers, or in some circumstances an additional tower in a particular section.

9.1.8 Using L12 towers for the proposed route would mean that over a large part of the route the spans between towers would have to be very short, resulting in a large number of towers and there would be problems meeting electrical clearances during high winds. The L12 tower was developed to suit very moderate terrain and the steep parts of the proposed line would require modified crossarms to accommodate uplift loads which would occur at the bottom of a slope.

9.1.9 APL 6/10 highlights that for altitudes above 200m the L12 suite of towers becomes increasingly uneconomic as a result of reduced spans. Most critically for the L12 type tower, at an altitude of approximately 140m, the swing of the suspension insulator set due to wind in a once-in-3 year storm would not maintain the specified electrical clearance. Introducing an abnormally short insulator set (which would require development and high voltage testing) could offset this problem up to 300m altitude, beyond which another arrangement would be needed. Reduced spans would not overcome the problem with insulator swing.

9.1.10 Sixty per cent of the whole route would be at altitudes over 200m and predominantly more so in the SHETL section. Mixing L12 towers and SSE 400 towers would not be desirable, as the geometric differences would make suspension insulators hang out of the plumb. By the summer of 2004 BBPNL’s studies had confirmed that the L12 series of towers, even in a strengthened form, were not
suitable for use at altitudes above 300m and even at altitudes as low as 150m restrictions would require to be placed on span lengths. SHETL has therefore decided to proceed with the design of a new suite of towers (SSE 400) with a similar outline to the L12 suite of towers.

9.1.11 Creating a tower suite with an electrical clearance window to accommodate these conductor swings would require longer crossarms, with slightly more vertical separation between them. This would need a new tower body and would enable the tower strength to be better matched to the ideal spans for profiling, and the introduction of a long span line tower especially suited to the highest altitude bands. The overall effect of the new tower suite would be to dramatically reduce the number of towers required on the SHETL section of line. By reference to the plotting instructions, the SSE 400 towers in the range of 200-250m altitude could accommodate spans 60% greater than the L12. That would allow considerable flexibility when siting towers. The new tower would also provide a wider range of body extensions which could modify the tower height to that just needed for clearance, and a wider range of leg extensions to accommodate slope on the site.

9.1.12 Each tower would carry two 3-phase circuits and one earthwire. The towers would have three horizontal crossarms. On line towers, each phase would require two 700mm² AAA Conductors (twin Araucaria), which would be attached to insulators which would hang vertically from the crossarms. For tension, angle and terminal towers, the conductors would be attached to the insulators connected horizontally to the cross arm. The towers would range in height between 42m and 65m, with the majority between 50 and 56m, as dictated by the topography and span length between towers, which would vary between 275m and 450m.

SPT towers

9.1.13 The proposed overhead line would reach a maximum altitude of 300m within the SPT franchise area. Given the circuit rating, the only complete tower design suite available to SPT, without redesigning a new suite of towers, was the L12 tower series. The L12 type tower, modified by using thicker steel on some cross arms and imposing a maximum single span limit of 650m and maximum limit on adjacent spans of 800m would comply with the British Standard for 400kV overhead lines and was therefore selected because it had been used successfully by SPT from the late 1970’s. It was also considered that the network could best be safely and efficiently operated and maintained by employing the L12 tower design with modifications rather than moving to a new design with incremental operation and maintenance costs. As a result, a modified L12 tower has been developed, designated L12X, which meets requirements within the SPT section of the line.

9.1.14 The majority of SPT’s overhead transmission lines carry two 3-phase circuits and one earthwire. The towers are galvanised steel lattice type and are designed as straight line or angle/terminal towers. On straight line towers, the conductors are attached to insulators suspended vertically from each crossarm and at angle/terminal towers, the conductors are tensioned to twin insulators in a generally horizontal formation. The tower galvanised steelwork is grey in colour. Insulators are typically coloured porcelain or clear glass. The majority of the towers would be between 46 and 50m in height, with extremes from 42 to 58m (ES Figure 10.3 shows outline
design). The spacing between the towers would vary depending on topology and altitude, among other matters, but generally would be in the range 275 – 450m.

**Consideration of other towers**

9.1.15 The applicants have noted that National Grid has extended the L12 range of towers to include a line tower and light angle tower of reduced height by incorporating two phases of each circuit onto a single crossarm (an arrangement known as a ‘Danube’ tower). The towers have been given very limited use in England and are not capable of carrying the same loads as the L12. To accommodate two phases the bottom crossarms of the line tower are 29.2m across compared to 14.2m on the normal L12 line tower. To achieve the same conductor to ground clearance the bottom crossarm in each case would be at the same height. However the low height tower was made with a standard body 2.1m shorter, further restricting the conductor spans it can accommodate. The tower also uses an earthwire peak 2.2m shorter than the L12 and therefore reduces lightning protection to the conductor.

9.1.16 Since the Danube type towers would fail to conform with significant requirements of the project specification, no further evaluation was made of them. It is conceded that such towers could be used for short sections of the proposed line subject to specific design parameters being met. That would however, require a further 4 to 5 months design period and there might be a problem with electrical clearances. A low level gantry terminal tower would not be appropriate to use in place of the proposed terminal towers since it would be too low to the ground. In addition the conductors would have to cross from vertical to horizontal. That would require a very short span and balancing would have to be introduced on the end tower.

**Network reconfiguration**

9.1.17 In order to minimise the overall number of towers and avoid the crossing of existing circuits in the vicinity of the Denny North area, it is proposed to merge the proposed line and the existing 275kV lines in the Carbrook Mains area, to the south east of Plean. This would be done by constructing a new section of line running in a north to south direction, to the south of the existing Longannet to Bonnybridge circuits. These circuits would then be diverted onto the new towers, freeing up a section of the existing tower line to connect onto the proposed new Beauly circuit and connecting into Denny North, as shown in the Second Addendum Figures 15.1 – 15.6 and Annex 15 (CD – A07).

9.1.18 This circuit “shuffle” at Carbrook Mains would reduce the impact of construction and allow the correct configuration of the circuits for substation entry. It would also offer the opportunity to reconductor in this area from four wire bundled “Zebra” conductors to twin Araucaria and thereby reduce the visual impact of the conductors.
Deviations of existing power lines

9.1.19 As part of the construction of the proposed overhead line, work would require to be undertaken on the existing 132kV overhead transmission lines, and on the 33kV and 11kV distribution lines in areas where the proposed line would cross these existing lines. This work would be required to enable the proposed line to be safely constructed without damage to the existing lines and without endangering those working on the new overhead line construction.

9.1.20 Technical Annex 13.1; “Report on Line Crossings” in Volume 5 of the ES (CD A05) details the work that would be necessary for line crossings at each crossing point. The types of works required to the existing lines would vary according to their voltage. At 132kV, the existing line would be supported on lattice steel towers and in order for the proposed 400kV line to safely cross over the 132kV line, the height of this line would be reduced by dropping the conductors onto wooden trident poles, generally 12m in height. The 33kV and 11kV distribution lines comprise wood pole lines and where these would be affected by the proposed 400kV line, the preferred solution would be to place these lines underground for the duration of the construction works. Works required to divert existing overhead lines would be carried out prior to the conductor stringing of the proposed 400kV overhead line, or in some instances to relieve proximity issues before new 400kV towers were constructed. The temporary diversions would be removed after the commissioning of the proposed line.

Tower foundations

9.1.21 An assessment of the ground conditions for the length of the line has been made, so as to allow a range of suitable foundation designs to be drawn up for each tower type and to make a preliminary selection of foundation at each tower location (APL 6/9). The assessment was initially collated from the British Geological Survey solid and drift maps, existing borehole logs (APL 6/12), and a walkover survey of parts of the line by a geotechnical engineer. In addition, a number of intrusive investigations and additional walkovers were conducted in April 2005 (APL 6/13).

9.1.22 Conventional foundations for towers involve a relatively deep excavation in which a reinforced concrete pad and column are cast and the excavated material used as backfill. For safety in construction these excavations would be limited to 5.0m for generally dry sites and to 3.5m where there was a high water table. For most angle towers this type of foundation would only be practical where the water table was low. Where strong cohesive soils were present there would be an augured excavation, comprising a 1.0m shaft to a depth of 6-9m. In weaker soils, smaller diameter minipiles (300mm) could be placed in groups with a buried pile cap. Where sound rock was encountered drilled rock anchors could similarly be combined in a buried cap.

9.1.23 Reinstatement of excavations would involve separating the topsoil, including peat, on site and replacing it over subsoils to the pre-existing depth in order to encourage re-establishment of the existing vegetation.
Existing 132kV line – diversions and dismantling

9.1.24 The existing 132kV overhead transmission line between Beauly and Denny is 220km in length and consists of 815 towers of varying ages which connect into the Fasnakyle, Fort Augustus, Errochty and Braco substations en route to the Bonnybridge substation. The existing 132kV line would require to remain operational wherever possible to ensure a secure electricity supply until the proposed 400kV overhead transmission line was energised. Following commissioning of the proposed new line the existing 132kV line would become redundant and would then be dismantled and removed.

9.1.25 To dismantle conductors it is proposed to use a winch to release the tension of the line and then lower the conductors to the ground where they would be cut into manageable sections, coiled up and removed from site. The dismantling of each tower would be assessed on an individual basis. The tower would either be felled in a controlled manner using a steel cutter to cut the two back legs and then be pulled over onto its side using a tractor and winch, or it would be unbolted and lowered in sections using a crane or derrick. Once on the ground, the tower would be cut into smaller manageable pieces and removed from site.

9.1.26 To remove foundations, an excavator would be used to expose each of the four tower legs to a depth of about 1m, or 300mm in sensitive sites, such as Natura sites. The concrete on the exposed foundation would then be broken into manageable sizes exposing the tower leg steelwork underneath which would then be cut and removed.

Access Track Strategy and Methodology

Track corridors and limits of deviation (LOD)

9.1.27 Appendix D of the ES (CD A03) sets out the Access Strategy, the aim of which is to ensure a consistent approach to defining safe access for construction along the route by either permanent or temporary tracks. Access design principles are set out in section 1.5 of Appendix D and general track routeing strategy in section 1.4. The latter section defines the width of track corridors as follows (paragraph 1.4.2.2):

- In areas of greatest sensitivity (Natura sites) only minor refinement (within 50m each side of the indicative route of the access track) to the route would be allowed when construction proceeds. The 100m LOD corridor has been defined to ensure that effective environmental mitigation can be achieved if a new constraint (such as an otter holt) is identified.
- In a few locations where specific environmental sensitivities (such as properties, ecological and/or archaeological constraints as defined in the relevant technical chapters of the ES) and land use needs have already been defined (e.g. forestry felling requirements etc.) a wider corridor is shown. This is at most a 200m wide corridor but the width would depend on the particular location. In areas where the access track would be built adjacent to the line, in commercial forestry for example, it could follow the approximate 80m swathe allowed to build the overhead line.
• In the majority of other areas a wider access corridor of up to 300m has been defined. Within this corridor existing tracks could be upgraded and access spurs or new tracks could be constructed. LOD corridors and indicative access tracks are shown for these and all other sites on plans of an appropriate scale in the ES.

9.1.28 All committed mitigation measures defined in the ES for the overhead line, the access tracks and the associated works such as construction compounds would be included in the Construction Procedures Handbook (CPH) or in contracts for particular works such as for works to the existing road network and substations. Annex 14 of the Second Addendum (CD-A07) sets out the Access Track Construction Methodology (ATCM), which is intended to serve the following purposes:

• As a part of the CPH it would provide site personnel with a step–by–step procedural guide to delivering the committed mitigation measures associated with access tracks by using the Access Track Constraints Protocol (ATCP) contained in Annex A to the ATCM.

• It would provide detailed technical specifications for construction of the various types of access track.

Need for and use of tracks

9.1.29 The construction specifications for the access tracks have been prepared in accordance with current best practice, as set out in the SNH document "Constructed Tracks in the Scottish Uplands" (CD K04) and the Forestry Commission document "Forest & Water Guidelines" (APL 6/27). Accesses capable of carrying the load from 100 tonne cranes and other heavy plant would be required for the construction of each tower. Wherever possible access to tower locations would be taken via existing tracks or, where no existing tracks were available, with low ground pressure plant and/or proprietary matting systems. However, in prolonged wet weather or on poor or steeply sloping and/or uneven ground, matting would be of little use and some form of stone track would be required. It would be preferable to use stone roads to access towers where conductor winches would be used. Winch sites would be primarily angle tower sites which would be located every 3km to 4km along the overhead line route.

9.1.30 It is intended that areas of deep peat and raised bog be avoided but this might not always be possible. The applicants have therefore commissioned a specialist report "Geo-environmental Considerations with respect to Construction of Access Tracks on Peat" (APL 12/2/3/19). The key conclusions of that report have been taken into account and incorporated into both the Drumochter Hills Restoration Plan and the access track construction methodology.

9.1.31 Although inconsistent with the recommendations in CD K04, it is now proposed that floating tracks in peat areas would not have ditches cut into either side of the track. That is because following extensive discussions with SNH it has been agreed that such ditches did not represent construction best practice since they created instability in the peat surface. Instead drainage through the track would be maintained by putting a 50-100mm thick sand and gravel drainage layer with less
than 5% silt content immediately above the geotextile layer and by building cross drains into the track at regular intervals (ATCM section 6.4.2.5). The principal measures to minimise compaction of peat would be micro-siting to avoid areas of deep peat, and the use of geotextile and proprietary technologies such as geoweb, which would allow a smaller depth of stone to be used. The applicants have had experience of using these methods on the Inveraray to Sloy 132kV third circuit and have also sought advice from Morrison Construction who have had experience of peat compaction in the construction of the Ben Aketil windfarm on Skye. Where floating tracks would cross sloping ground it is proposed to cut into the upslope side and therefore avoid the use of gabion baskets on the downslope side. It is the applicants’ view that even if peat had to be stored for up to 4 years, provided good peat management practices were in place and stockpiling was avoided, the peat could be restored successfully. Reference is also made to page 123 of CD K04 which narrates how the National Trust for Scotland is restoring a number of upland tracks on the Mar Lodge Estate with ground along the former tracks being regraded to reflect the surrounding topography and revegetated with heather and turfs from the surrounding area.

Construction programme

9.1.32 APL 6/25 shows an indicative construction programme for the proposal with a number of critical paths. The indicative programme is based on receiving consents on 1 June in year one, commencing works on the Denny North Substation in July in year one and commissioning the new 400kV and 275kV circuits from Beauly to Denny North at the end of September in year 4. To complete the line to Denny North by the end of September in year 4, commissioning must begin at Beauly in the summer of year 3. The works at Beauly Substation would take a full outage window (April to October) and must therefore be completed in year 2. With 40 weeks preparatory works before the first outage, the substation rebuild must be underway by July in year one.

9.1.33 The minimum period to mobilise contractors after receipt of consent is considered to be four weeks. This dictates a cut-off date, for achieving the programme expectations, of 1 June in year one, i.e. if consent is obtained before 1 June in year one the new Beauly-Denny circuits could be commissioned in year 4. If consent is obtained after 1 June in year one the circuit could not be delivered until year 5. Stringing of the White Bridge area, between Tummel and the River Tay must be completed in year 2 and any preparatory works requiring outages must be underway in August in year one.

9.1.34 The dismantling would proceed as quickly as possible following the decommissioning of the relevant circuit. All sections should be dismantled by early year 5 although discussion is required in relation to environmental constraints which may delay the dismantling of some sections. The dismantling of the existing 132kV line could be completed by the end of March year 5.

9.1.35 The construction programme would consist of the following main activities over a 4 year period:
• Access would be installed/removed in accordance with the relevant schedules (APL 6/24) and ATMS. It is proposed to install the majority of access within the first 12-14 months of the programme. In order to attain this, the line would be split into 3 geographical sections – North, Middle and South. Although this would be managed as a single operation, it is probable that multiple local subcontractors would work in specified locations.

• Foundation installation, which broadly covers four types of soil condition: dry, buoyant, piled and rock. For non-conventional foundations such as piled, or rock anchor installation, the plant and resource used would be of a specialist nature designed specifically for the particular type of work.

• The transmission towers would be erected using a combination of mobile cranes and, where required, specialist lifting derricks. In order to allow flexibility, towers would normally be sorted into like bundles comprising tower type; leg extension; body extension, and common portion. Where access permitted, the towers would be transferred to site using standard haulage methods, pre-assembled in sections on site and lifted into place using mobile all terrain cranes, typically, in the 100t capacity range. Where access was restricted to helicopter working, the steel bundles would be reduced in size and weight, with some leg sections being flown in as single items only. Winches and derricks, dependent on type and specification, might similarly be broken down into reduced weight lifts.

• Conductor installation would be installed in sections and, typically, the section length to be worked on at any given time would be approximately 5-7kms in length, dependent on terrain, resource, equipment and tower types.

Undergrounding

9.1.36 A number of objectors consider that the applicants have placed too much emphasis on economic and technical considerations at the expense of environmental factors. There is no absolute means of comparing these often conflicting requirements. There may be other solutions, which could achieve an appropriate balance, but it does not follow that the project as designed has not successfully achieved such a balance.

9.1.37 The most contentious issue, and where the above claim is mostly directed, is that the applicants should underground all or at least sections of the line. As previously stated, the project has been designed as an OHL and following completion of the consultation process it has not been considered necessary to depart from that design approach for any part of the route. This approach is common to most new EHV transmission circuits constructed in a non-urban environment in the UK.

9.1.38 It has been inferred by some objectors to the project that the applicants have over estimated the cost of undergrounding in order to justify the decision to construct an OHL. In response to these claims, cost estimates for specific sections of the route have been prepared and even if the lowest costs quoted for undergrounding by others were correct, they would still be sufficiently high enough to justify the decision to design an OHL in accordance with the applicants’ statutory obligations. The applicants have taken account of the various objections but from the outset the project has been developed as an OHL, with super lattice towers as opposed to low
height towers, since they provide the best solution. Environmental issues have also been a predominant consideration in matters of routeing.

**Safety of the public**

9.1.39 In response to questions from the Technical Assessor the applicants provided written evidence regarding the steps that they had taken to address issues of public safety associated with the construction and operation of the line. That evidence is summarised in section 2.6 of the Technical Assessor’s report.

**THE CASE FOR HIGHLAND COUNCIL (THC)**

9.2.1 THC’s initial position during the inquiry was that the ES contained insufficient information to enable THC as Roads Authority to be satisfied that a full evaluation of the impacts of the proposed development on the council’s minor roads had been undertaken. In particular it was considered that the ES was inadequate in the undernoted respects:

- The roads affected by the proposed development had not been comprehensively identified.
- The traffic associated with the dismantling of the 132kV line had not been separately identified.
- The baseline traffic flows on the minor roads had not been identified and therefore the impact of the increase in traffic had not been identified.
- The condition of the roads and associated structures had not been established.
- Mitigation measures were only referred to in general terms and there was conflicting information.
- A final traffic management plan had yet to be prepared.

9.2.2 APL 6/33 details the methodology adopted by the applicants to identify the public roads to be used by construction traffic associated with the proposal but the assessment of the authors of APL6/33 (W A Fairhurst and Partners) is not accepted. At present the minor roads affected in the THC area carry light traffic and only occasional heavy vehicles. The works would involve a large number of heavy vehicles for between a year and 18 months so the percentage increase in heavy traffic would be considerable – of the order of hundreds of percent. There was nothing to show how the roads would be used by the applicants to manage conflict with other vehicles such as school buses and refuse lorries. In some places the roads were only 2.5m wide, which was the same width as the vehicles that would be using them. HC required to be in a position to assess the physical impact of the traffic on the roads and the ability of the roads to sustain that.

9.2.3 It was accepted that the applicants had put specific proposals to THC which sought to reach agreement in relation to a number of these issues but that no detailed response had been given by THC. It was also agreed that further discussions should take place between the applicants and THC with a view to resolving the matters outstanding and agreeing appropriate mitigation measures.
THE CASE FOR CNPA

Access tracks

9.3.1 CNPA is concerned that the ES overestimates the ability to mitigate impacts on certain habitats such as blanket bog and wet heath which are especially sensitive to the impacts of the construction process. The second addendum to the ES shows that new temporary access tracks would be needed along much of the length of the proposed line within the CNP, with a long linear impact on peatland habitats. The method statement for tracks on deep peat (the Second Addendum, Annex 14 section 3 and associated drawings CD A07) seeks to minimise the impacts, by advocating the construction of floating tracks and crushed stone surfacing. Although the applicants claim that the removal and reinstatement of these track means that the impact will be temporary, they have underestimated the impacts on the peatlands.

9.3.2 The weight of the track and associated construction traffic of up to 100 tonnes would compact the underlying peat, reducing its hydraulic conductivity. Even if backfilled with excavated peat, the structure of the peat displaced would be permanently de-natured, increasing conductivity and permanent drainage pressures. The cutting of ditches on either side of the track would also be likely to reduce the lateral strength of the peat mass supporting the track so that there would be a risk of peat displacement as it was squashed sideways. The temporary access tracks would therefore very likely have a permanent impact on the hydrology of the peatlands which they crossed. The scale of impact would depend on a variety of local factors, such as peat depth, peat type, slope and depth of peat de-naturing. The effects could be far reaching in certain circumstances, and would need to be assessed locally. The decision not to proceed with the construction of trackside ditches is therefore welcomed.

9.3.3 It is not suggested that the methodology set out in the Forestry Commission Scotland (FCS) and SNH guidance is wrong but that the way in which the applicants intend to apply the guidance is wrong. The restoration proposals do not differentiate between different areas of deep peat and other habitats. It is questioned whether restoring temporary tracks to the original condition is possible in areas of deep peat since the SNH guidance is inadequate for that purpose. It is conceded, however, that deep peat occurs in localised areas only, although these areas might be quite extensive, and that areas of blanket bog are minimal. It is also accepted that there are no specific guidelines for construction of temporary access tracks and that the applicants do not rely on the SNH guidance alone. It is acknowledged that micrositing would also be a part of the access track strategy.

9.3.4 As there is so much peatland along the proposed route through the CNP, and the impacts would be likely to be permanently adverse, it is not possible, on the evidence presented, to agree that the effect of the impact upon the habitats of the CNP would be of minor significance. Impacts on peatlands outwith the CNP would also be likely to be far more significant than indicated for the same reasons.

9.3.5 In closing submissions for the councils/CNPA it was stated that the methodology in CD K04 applied to the construction of permanent tracks and these...
were constructed on the premise that the impact would be permanent. They were also constructed in a manner that reduced environmental impacts but which allowed the track to fulfil its permanent purpose. In contrast, a temporary track would be there for a limited period of time and the councils/CNPA doubt whether the methodology proposed would facilitate restoration once the purpose of the temporary tracks had been fulfilled. The information available to the Scottish Ministers was accordingly insufficient to inform their decision as regards the likely impacts on peatland habitats occasioned by the construction of access tracks.

9.3.6 The councils/CNPA do not draw any comfort from the restoration of tracks at Mar Lodge since they were not constructed over deep peat but do welcome the fact that lateral drains would not now be installed alongside the temporary tracks.

9.3.7 THC and CNPA suggested that in some locations the use of a low height tower design could be used to reduce the visual impact of the proposed line. Their evidence in this respect is summarised by the Technical Assessor in paragraphs 3.1.35 and 3.1.36 of his report. They also suggested that, in the event of undergrounding, a low level gantry tower (see paragraphs 3.2.31 and 3.2.32 of Technical Assessor’s report) should be used to terminate lines at a sealing end compound rather than a terminal tower, in order to minimise impact on amenity.

REPORTERS’ FINDINGS AND RELATED CONCLUSIONS

9.4.1 We have noted the applicants’ indicative timetable, which was uncontroversial. We are satisfied that the proposals for the detailed design and construction of the proposed overhead line and the towers to support it meet the applicants’ requirements for the project, would achieve the specified power capacity and comply with the appropriate British Standards. Two different types of tower would be used – in the SHETL area a new suite of SSE 400 towers would be used and in the SPT area a modified L12 tower would be used. In the SHETL area the towers would range in height between 42m and 65m and span length would vary between 275m and 450m. In the SPT area the towers would range in height between 42m and 58m and span length would vary between 275m and 450m. We accept the findings of the Technical Assessor that the design of the line complies with relevant statutory requirements in respect of safety of the public and that the applicants are aware of further safety requirements that must be complied with before and after the line is commissioned (paragraph 5.1.18 of his report).

9.4.2 We note that the applicants have given some consideration to the use of low height or Danube type towers but that they consider that they would not be capable of carrying the same loads as the L12 tower and would fail to conform with significant requirements of the project specification. This evidence was not seriously challenged and we note that the Technical Assessor accepts the applicants’ position that specific designs of towers are necessary for the proposed line in view of the challenging climate and terrain. He also accepts that the low height tower design may require significant modification before it could be used and that there would be difficult amenity trade-offs to consider (paragraph 4.3.10 of his report). The applicants accepted that such towers could be used for short sections of the proposed line subject to specific design parameters being met which would require a 4 to 5 months design period.
9.4.3 In view of the foregoing, we see no reason to disagree with the conclusions of the Technical Assessor (paragraph 5.1.19) that the use of the low height L12 tower may be appropriate in particular locations where it can be demonstrated that the use of such towers would provide a significant amenity advantage over the designs proposed and always provided that Health Protection Agency (HPA) guidelines can be met.

9.4.4 We accept that there would be additional technical issues that would require to be addressed with the use of a low level gantry terminal tower but there has been no technical evidence to demonstrate that such a solution would be impractical. We therefore see no reason to disagree with the conclusions of the Technical Assessor (paragraph 5.1.20) that if, at particular locations for sealing end compounds such a solution offered significant amenity advantages, then that option should be investigated.

9.4.5 The specifications for construction and removal of access tracks have been prepared after discussion with SNH and have regard to the guidance contained in CD K04, APL 6/27 and APL 12/2/3/19. The access track construction methodology, specification and mitigation measures would be contained in the CPH.

9.4.6 THC has expressed concern regarding the impacts of the proposed development on the council’s minor roads. We recognise the concern of THC in this respect and have accordingly recommended conditions to address this and the concerns of other Roads Authorities in Chapter 21 of this volume and the relevant chapters pertaining to the local inquiry sessions.

9.4.7 Concern has been expressed on behalf of the councils/CNPA at the impact of the proposed access tracks on habitats and, in particular, on peatland. We have noted that in this respect the applicants rely upon the guidance contained in CD K04, APL 6/27 and APL 12/2/3/19. They have also had extensive discussions with SNH on this issue which has resulted in the applicants no longer proposing that floating tracks in peat areas would have drainage ditches cut into either side of the track. That has been welcomed by the councils/CNPA.

9.4.8 We also note that the councils/CNPA do not suggest that the methodology set out in the FCS and SNH guidance is wrong but only that the way in which the applicants intend to apply the guidance is wrong. It is stated that this is because the restoration proposals do not differentiate between different areas of deep peat and other habitats and it is questioned whether restoring temporary tracks to the original condition is possible in areas of deep peat. It is not disputed that the applicants do not, however, rely on the SNH guidance alone. Reliance is placed on APL 6/27 and APL 12/2/3/19. Micrositing would also be a part of the access track strategy.

9.4.9 We note that at page 74 of CD K04 it is stated that geotextile tracks can be used to construct temporary tracks. That is one of the measures which the applicants have said they would consider taking along with micro siting and the use of geoweb to minimise compaction of peat. We consider therefore that it is entirely appropriate for the applicants to have regard to the guidance contained in this document.
9.4.10 APL 12/2/3/19 is a desk based assessment by WSP Environmental Ltd (WSPE) of the geotechnical characteristics of peat with respect to access track construction for the proposed project. The report states that in order to minimise impact on peatlands it is anticipated that the primary mitigation measure would be to avoid routeing tracks through any areas of peat, where practical. Where that was not possible, it is considered that floating the tracks on top of the peat would reduce the overall impact on the peatland. The additional use of geosynthetic materials could provide a separation layer between fill materials and the peat and reduce the overall loading of the track. The report goes on to state that consultation would, however be required with the relevant environmental and planning regulators. We consider that to be a sensible precautionary measure.

9.4.11 WSPE and Natural Capital Ltd (NC) were also commissioned by the applicants to prepare an ATCP which would identify all known environmental constraints within the proposed access track LODs so that tracks could be designed and built with minimum environmental impact. That ATCP is shown in Annex A to Annex 14 of the Second Addendum which contains the ATCM where relevant information to guide the detailed engineering design and construction of tracks has been collated.

9.4.12 We attach considerable weight to the fact that SNH takes no exception to the applicants’ proposals for access track construction, provided the CPH is based upon Annex 2 of the Second Addendum and forms part of each relevant construction contract for the project. We are satisfied that the applicants have given careful consideration to the potential for impacts on areas of peat and have, following consultation with SNH, devised an appropriate access track construction procedure and methodology and have put in place appropriate mitigation and habitat restoration measures. We conclude therefore, that implementation of the relevant provisions of the Construction Procedures Handbook, which contains the ATCM (Appendix 8), should ensure that the applicants’ proposals in this respect are acceptable.