

APPENDIX 8

Mitigations and Contingency Plans

The Appendix summarises the measures that have been put in place, or can if necessary be put in place to ensure that the project is successful and delivers at least the anticipated level of benefits. For ease of reference the measures are grouped below under four categories.

(Note that in the sections below “success” may be defined differently to in Section 9)

Category #1: Ensuring Project Technical Success

The following measures have been taken to confirm that the probability of technical success is high, i.e. that it delivers a vessel and joint that can undertake repairs:

- i) We have ensured that the underlying technologies used in vessel modification and the universal joint are not new. The equipment that would be bought for the Wave Sentinel is largely off the shelf and none would be a “first of a kind” – it is the application of the equipment that is innovative. Similarly the universal joint would be based on proven onshore jointing technologies.
- ii) The basic design work has already been undertaken by GMSL (see Appendix 10).
- iii) The basic design has been independently checked and verified by Red Penguin (see Appendix 3).
- iv) We have met and held discussions with multiple cable joint developers who have already given considerable thought to the design of a universal joint. We will select our joint development subcontractor through a competitive process, allowing us to ensure that a suitably mature and low-risk option is selected.
- v) The concepts developed by the potential joint development contractors have been checked by CCI (see Appendix 4) who have confirmed overall viability.
- vi) The project is divided into an “initial” phase followed by a “main” phase where the vast bulk of expenditure will occur. During the initial phase detailed design work will be undertaken and the acceptability of the project will be checked. This checking will extend to ACMA, the vessel classification society, other OFTOs and insurers; it will not be limited to TCS and its advisors.
- vii) GMSL has successfully undertaken similar work previously (e.g. conversion of the *Sovereign* to lay power cables and conversion of a vessel of opportunity to joint the BritNed cables).
- viii) TCS is experienced in project management of technically complex projects (e.g. OFTO acquisitions and maintenance, HVDC interconnector development) and will be advised by industry specialists.
- ix) To ensure that technical success has been achieved before the project completes, the budget includes an extensive campaign of lab tests on the universal joint, sea trials for the vessel’s station-keeping and a sea trial on the jointing process itself.
- x) There is an option of selecting a particularly conservative joint design, for instance basing the design on an onshore joint that has been tested/used at 220kV and then applying it at 132-150kV.

- xi) We plan to undertake multiple, sequential cable joint tests, with time between each test to review results and, if necessary modify the design. This is a lower risk than undertaking tests simultaneously.
- xii) We will put in place a clear project management structure (see Appendix 5). This will facilitate rapid decision making to address technical challenges.
- xiii) The risk of damage to the *Wave Sentinel* during conversion (e.g. due to a fire on the ship while it is being modified in a shipyard) will be mitigated by using reputable contractors and ensuring compliance with all relevant safety legislation and good practice. Further mitigation is provided by the insurances put in place by GMSL which will pay for the vessel to be repaired and the replacement of any damaged equipment whether existing or part of the modification work.

Category #2: Ensuring Project Delivery within Budget

The project may be technically successful, but at a price that exceeds the budget set out in Section 3. The following measures have been taken to reduce the probability of this occurring:

- i) The project is divided into an “initial” phase followed by a “main” phase where the vast bulk of expenditure will occur. At the initial phase the detailed design is undertaken and bids are solicited from subcontractors. This provides confirmation that the project is highly likely to come in within budget before the decision is taken to proceed with the bulk of expenditure. It also gives an opportunity to take appropriate measures at an early stage if costs are escalating. Such actions include modifying the scope of work, seeking additional funding, trading time for reduced cost, and abandoning the project.
- ii) During the “main” phase the work is to be undertaken by GMSL at a fixed price, largely eliminating the risk of cost escalation at this stage.
- iii) Considerable attention has been given to ensuring that budgets are adequate for the work envisaged. Budgets are based on the considerable experience of GMSL and a prospective cable joint developer along with budget prices from subcontractors (see Section 6). Additionally these budgets have been independently verified (see Appendices 3 and 4).
- iv) TCS, along with specialist advisors, would continuously monitor GMSL and be in a position to take action immediately should issues of cost escalation and/or inadequate budget emerge. As noted previously, TCS is experienced in the management of large and technically complex projects.
- v) A significant contingency amount is provided in the budget to deal with unexpected events.
- vi) Use of competitive tendering for essentially all subcontractors reduces the risk that costs will escalate because of the monopolistic position of a particular subcontractor.
- vii) Protection against the financial failure of GMSL is provided by the fact that GMSL will be providing a letter of credit from a suitably creditworthy financial institution (see Appendix 2).
- viii) The clear project management structure facilitates rapid decision making to address unexpected budgetary challenges.
- ix) The vessel conversion work is expected to complete considerably ahead of the joint testing, which is itself separated from the end date by a period for reporting and a slack (buffer) period. This means that if costs escalate it should be possible to trade time for reduced cost, and there should be no need to pay a premium for rapid work.

Category #3: Ensuring GB-wide Concept Adoption

Even if the project is technically acceptable and within budget it will struggle to achieve its benefit targets if it is not widely adopted by relevant network licensees. This is unlikely for the following reasons:

- i) The fact that the *Wave Sentinel* operates within the ACMA framework provides a very easy and low cost mechanism for network licensees for access the benefits of the modified vessel and universal joint.
- ii) Relative to the small fee for ACMA membership the benefits should a fault occur, even allowing for the probability of a fault, are disproportionately large (c. ■■■ per day versus c. ■■■ per day). This should cause all relevant network licences to join ACMA in a relatively short period of time.
- iii) The universal joint will be tested to the full set of Cigre standards for high voltage cable joints (see Appendix 4) and should be fully compliant, with one exception. The exception relates to the fact a universal joint, by definition, cannot be tested “as a system” with every possible cable combination. CCI has advised on an approach (see Appendix 4) that should ensure reliable operation despite this technical non compliance.
- iv) The project is already being marketed to potential users by GMSL/ACMA. Conferences have been held, along with a tour of the *Wave Sentinel*.
- v) The discussions with other OFTOs referred to in Category #2 above will ensure that there is broad technical acceptance of the vessel and joint before the start of the “main” phase.

Category #4: Ensuring Anticipated Benefits are achieved over the Long-term

Even if the project is technically acceptable, within budget and widely accepted there are factors that might reduce its net cost-benefits to below the target level. The following measures have been taken to reduce the probability of this occurring:

- i) The benefit estimate presented in the funding application is very conservative. For instance it does not include the following benefits:
 - Faster/cheaper repair of non-OFTO GB-transmission cables (e.g. bootstraps, interconnectors, island links).
 - Faster/cheaper repair of cables during construction.
 - Reduction in the capital cost of offshore wind export cables by using fewer, larger cables.
- ii) Purchasing services through ACMA, which provides the following benefits:
 - It should ensure the stable long term provision of services. ACMA’s stable long-term nature is illustrated by the fact that it has been in existence since 1965.
 - ACMA is expected to broadly retain its price levels which currently offer excellent value-for-money. As a not for profit organisation ACMA is run for the benefit of its members, and is able to negotiate attractively prices for its services because of its size (i.e. “bulk buy” discount for its 60+ members) and its ability to offer vessel owners long-term income stability.
 - Although the value of the Wave Sentinel will be increased by the modification work, the amount paid by ACMA will not increase. This is because the telecom companies that dominate ACMA and pay nearly all of its costs will not accept higher costs solely for the benefit of a small number of power cable owners (920km of OFTO cable currently versus 140,000km of telecom cable in ACMA).

- iii) Should the Wave Sentinel not remain in ACMA for any reason then compensation is paid which will ultimately refund the cost of conversion to the British transmission customers. The same compensation would apply if ACMA fails or becomes unattractive – though after almost 50 years of successful operation this seems highly unlikely.
- iv) A long-term call off agreement would be put in place with the joint development subcontractor to ensure that they can provide specialist power cable jointing staff rapidly in order to assist GMSL staff when assembling the universal joint; this is likely to be particularly important if the rate at which the joint is used is low and GMSL's jointers only undertake power cable work every year or so. The call-off agreement would also set long-term indexed man-hour rates for both this service and for the provision of training services to GMSL or others.
- v) The default IPR arrangements are being used to ensure that customers receive the benefit of any IPR created by the project.
- vi) TCS is already working on repair consents that would be pre-agreed with the MMO to avoid the permitting process delaying repairs (e.g. in areas with an environmental designation such as Morecambe Bay and The Wash).
- vii) TCS is already undertaking "TDR fingerprinting" and setting up arrangements to rapidly mobilise a variety of other fault-location techniques. This will help to ensure that the ability to rapidly mobilise a vessel will not be compromised by fault location delays.