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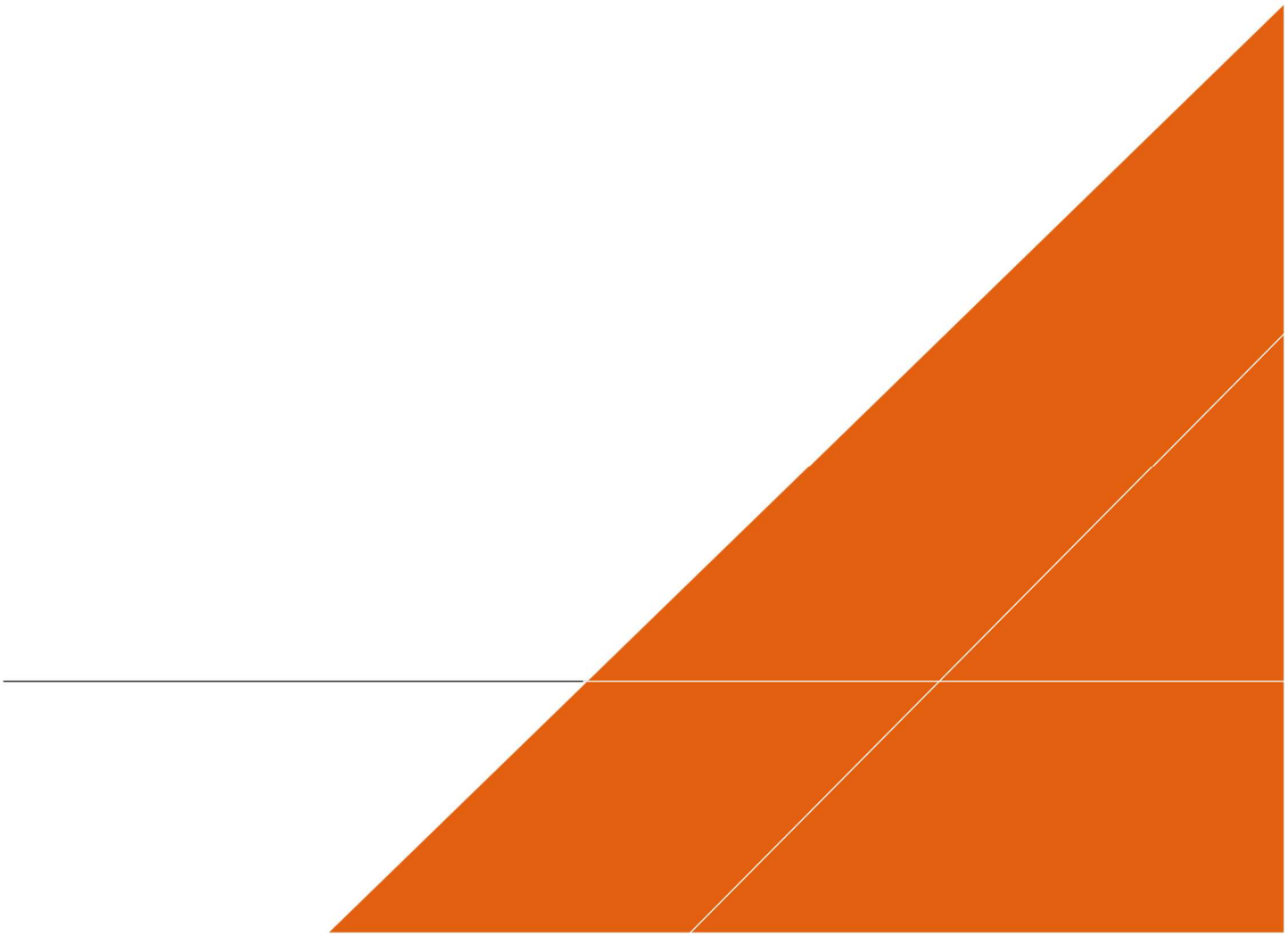
RIIO-T2: INVESTMENT PLAN – ENGINEERING RISK REVIEW

SP Energy Networks

SEPTEMBER 2020



CONTACTS

MARK DOCHERTY
Partner

m +44 (0)7469 034565
e Mark.Docherty@Arcadis.com

Arcadis.
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DAVID PORTER
Director

m +44 (0)7836 691368
e David.Porter@Arcadis.com

Arcadis.
Cornerblock
2 Cornwall Street
Birmingham
B3 2DX
United Kingdom

VERSION CONTROL

Version	Date	Author	Checker	Approver	Comments
V0_95	20/08/2020	D Porter	R Williams	M Docherty	Draft Report for comment
V1_0	02/09/2020	D Porter	R Williams	M Docherty	Final Report

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APPENDICES

APPENDIX A

Executive Summary

At the Draft Determination stage of the RIIO-T2 Price Control Review, a number of interventions were made by Ofgem, which reduced the overall value of the investment plan proposed for Scottish Power Transmission (SPT). A key area of intervention related to reductions in the risk contingency amounts allocated to the Load and Non-Load categories of expenditure.

These risk reductions equate to approximately £44M over the 5-year price control period, with more than 85% of this total being attributable to exclusions from Lead and Non-Lead assets[1]. Arcadis was engaged by SP Energy Networks (SPEN) to review the background to Ofgem's risk related interventions to assess whether the reductions contained in the Draft Determination were justified.

Asset Risk Removal

Arcadis has reviewed Ofgem's rationale for reducing the risk allocations from the projects classified as 'justified' in the Draft Determinations. The primary risk intervention in the Draft Determinations was the removal of contingency amounts apportioned to Lead and Non-Lead assets in SPT's project cost estimates. This intervention was justified by Ofgem on the assumption that estimates had been derived from equivalent project outturn costs, and therefore risk contingency amounts would already be incorporated in input costs. Arcadis has therefore focused on the sources of the input cost data used by SPT to create the RIIO-T2 Totex forecast, and to determine whether risk is embedded or excluded accordingly.

Basis of SPT Project Cost Estimates

Arcadis can confirm that SPT has applied its Manual of Standard Costs (MoSC) to estimate the costs of the projects contained in the RIIO-T2 investment plan. This MoSC comprises a number of asset category specific spreadsheets detailing equipment supply and installation costs at a disaggregated level.

Inputs to the MoSC are derived from a variety of sources. However, all MoSC costs have been found to originate from the procurement phase of project development rather than post-delivery outturn costs. The level of input cost disaggregation in the MoSC varies by asset category and includes the following information sources:

- Supplier framework rates, e.g. transformers;
- Recent tender prices, including Best and Final Offers (BAFO), e.g. overhead line works;
- RIIO-T1 contract values, e.g. substation refurbishments;
- Indicative costs provided suppliers/manufacturers as part of Requests for Information (RFIs), e.g. synchronous condensers; and
- Historic prices from TPCR4 and RIIO-ED1 adjusted for inflation.

Where a broad dataset is available for a particular asset category from a range of suppliers, MoSC costs are derived from averages following removal of any outlier values to avoid distortions. The disaggregated recording of asset costs in the MoSC enables SPT to build cost estimates on a granular bottom-up basis.

As the MoSC inputs are largely derived from tender and contract values rather than project outturn costs, project risks encountered during delivery are not fully captured in the MoSC. Therefore, any additional delivery risk related costs will be incurred by SPT. Arcadis regards the application of project-specific risk uplift percentages as an appropriate means of capturing these delivery risks being managed by SPT.

SPT Contracting Strategies

The level of risk being assumed by GB Transmission Owners (TOs) during project delivery is significantly influenced by contracting strategies. Where TOs adopt Engineering, Procurement and Construction (EPC) or Turnkey based approaches, a high proportion of risk will be transferred to suppliers and contractors and reflected in tender and contract prices.

[1] As defined in Ofgem's Business Plan Data Tables (BPDT)

Over the past decade, SPT has adopted an increasingly disaggregated contracting approaches using multiple suppliers and contractors to deliver projects. This approach is designed to encourage supply chain competition and enable a broader range of contractors to participate in procurement events, with the overall objective of reducing project costs. The level of contract disaggregation adopted by SPT varies by project type and value. This disaggregated approach was initially implemented across substation projects, especially in relation to enabling and civil works. Further disaggregation is achieved through the use of SPT and Iberdrola framework agreements for equipment supply, where assets are made available 'free of charge' to the appointed installation contractor, e.g. transformers and switchgear.

SPT's disaggregated contracting and delivery strategy seeks to minimise risk exposures for supplier and contractor organisations. This approach also requires SPT to undertake additional design and project management activities inhouse. Therefore, under this disaggregated model, SPT assumes a higher level of design and delivery risk relative to EPC-based approaches and these costs are not captured in the MoSC.

SPT Project Risk Assessment and Management

SPT's approach to risk assessment is to identify and quantify the specific risks relevant to each project for inclusion in project cost estimates. Risk assessment is part of the investment authorisation processes and risks are refined through the various gate stages (e.g. IP3/4/5) to final approval. During the project delivery phase, risk contingency amounts can be released subject to formal review and approval. SPT reviews the risk related expenditure incurred following project completion to inform future project risk assessments. Arcadis was provided with evidence of SPT's approach to risk quantification and contingency approval as part of this review for a sample of projects.

Asset Risk Conclusions

Having reviewed SPT's approach to project cost estimation, the input data sources and approach to risk assessment, Arcadis does not agree that the removal risk contingency amounts from Lead and Non-Lead Assets in the RIIO-T2 Draft Determinations is justified for SPT. Arcadis has reached this conclusion having established that SPT's MoSC cost estimation inputs are largely based on tender, contract and framework prices rather than project outturn costs.

Arcadis also recognises that SPT's contracting approach seeks to minimise supplier / contractor risk. Therefore, the removal of Lead and Non-Lead asset risk in the Draft Determinations does not capture all SPT's project delivery risks. Arcadis therefore concludes that the application of risk uplift factors to Lead and Non-Lead asset costs remains appropriate and should be reinstated.

RIIO-T3 Project Risk Removal and Capping Mechanisms

The secondary risk reduction mechanisms applied in the RIIO-T2 Draft Determinations related to:

- The exclusion of risk for projects where delivery spans the RIIO-T2 and RIIO-T3 periods; and
- The capping of non-asset risk at the average project portfolio risk percentage.

Arcadis does not support either of these interventions and regards both mechanisms as arbitrary and unjustified for the following reasons.

Removing or deferring risk from projects scheduled to complete in the RIIO-T3 period fails to recognise risk exposures arise throughout the project lifecycle and include the early stages of a project. Such risks can impact project delivery through to completion, e.g. site studies and surveys, design variations and planning and consenting activities. A more equitable solution would be to allocate risk contingency amounts in line with the forecast expenditure profile.

Although the materiality of non-asset risk capping intervention (at the average project portfolio risk) is low, the mechanism proposed in the Draft Determinations is unnecessarily complex and disproportionate. This intervention fails to recognise the disaggregated nature of project risk quantification and applies a backward step of capping risk at an average (non-project specific) level. As this capping mechanism cannot be justified from a logical or implementation perspective, Arcadis recommends removal of this mechanism.

Introduction

In July 2020, Ofgem issued its RIIO-2 Draft Determinations in relation to the business plan submissions from electricity and gas Transmission Owners (TOs) and the gas distribution network operators in Great Britain. These business plans contain Total Expenditure (Totex) forecasts for the period 2021 – 2026. Following an 8-week consultation period, Ofgem will engage with the energy network licensees and other stakeholders before issuing the RIIO-2 Final Determinations in December 2020.

For electricity transmission, Ofgem's Draft Determinations contained a number of investment plan interventions, which significantly reduced the overall value of the investment plans for all electricity TOs. A key intervention related to reductions to the risk contingency amounts allocated to project cost estimates in both the Load Related Expenditure (LRE) and Non-Load Related Expenditure (NLRE) categories.

For Scottish Power Transmission (SPT), these risk related interventions equate to £43.7M over the 5-year price control period. The Draft Determinations contained the following 3 mechanisms to reduce the risk contingency amounts allocated to project costs estimates in each of the TO investment plans:

A. Exclusion of all Risk Contingency Amounts for Projects scheduled to complete in the RIIO-T3 period;
B. Removal of Risk Contingency Amounts from Lead and Non-Lead asset costs for justified projects; and
C. Capping Risk for non-asset costs at the average portfolio risk percentage calculated for the full project investment portfolio.

A breakdown of the values of these risk related reductions to the SPT RIIO-T2 investment plan is presented in Table 1.

Table 1 - Financial Materiality of Risk Related Interventions on SPT's RIIO-T2 Investment Plan

Investment Category	A. Risk Removed from Projects Completing in the RIIO-T3 Period (£M)	B. Risk Removed from Lead & Non-Lead Asset Values in the RIIO-T2 Period (£M)	C. Risk removed from RIIO-T1 & T2 Projects by the Average Capping Mechanism (£M)	Total Risk Deductions (£M)
LRE	£4.98	£20.80	£0.16	£25.93
NLRE	£0.65	£16.97	£0.15	£17.76
Total	**£5.63**	**£37.77**	**£0.30**	**£43.70**

Source: Arcadis analysis of Ofgem Risk & Contingency spreadsheet model

Table 1 confirms that approximately 86% of the total risk reduction is attributable to the exclusion of Lead and Non-Lead asset risk (Category B above). Exclusion of all risks from projects completing the RIIO-T3 period (Category A) represents approximately 13% of the reductions, with the remaining 1% attributable to the capping mechanism (Category C).

Arcadis was engaged by SP Energy Networks (SPEN) to review the background to each of the project risk related interventions contained in the RIIO-T2 Draft Determinations to assess whether the investment reductions for SPT were justified.

1 Arcadis Approach to Risk Review

The primary focus of this Arcadis review was to examine the inputs to SPT's project cost estimates included in the SPT RIIO-T2 investment plan. This focus on input costs was to clarify whether risk was already embedded in SPT's project cost estimates to determine whether the removal of risk contingency amounts from Lead and Non-Lead asset costs in the Draft Determinations was appropriate or justified. This objective was driven by the significant financial materiality of Ofgem's interventions in this area. Arcadis estimates that this intervention removed £37.8M from SPT's investment plan.

A secondary objective was to review the other risk related interventions at Draft Determination with respect to Ofgem's rationale and accuracy of implementation. Arcadis estimates that £5.6M was removed from the SPT investment plan through the exclusion of risk for projects scheduled to complete in the RIIO-T3 period. Similarly, Arcadis estimates that a further £0.3M was removed from the investment plan by the risk capping mechanism for non-asset costs.

1.1 SPT Cost Estimation Methodology & Input Cost Review

Between April and November 2019, Arcadis provided RIIO-T2 cost efficiency assurance for a selection of projects included in the SPT investment plan. The Arcadis approach to cost assessment was to undertake deep-dive reviews of SPT scheme papers and costing sheets, supplemented by discussions with relevant SPT engineers. In general, Arcadis found the costs presented by SPT to be reasonable and efficient. Where anomalies were identified these were fed back to SPT and subsequently addressed. As part of these reviews it was necessary for Arcadis to consider the full scope of work proposed for each scheme in order to capture all project specific requirements and make adjustments to benchmark costs accordingly.

A key area of investigation during the previous assurance exercise was to confirm the use of Prime[2] project costs for the schemes included in the baseline RIIO-T2 plan. When investigating SPT's Prime project costs, an initial check was undertaken to confirm that the various cost components comprising each scheme were presented net of risk contingency amounts. This was relatively straightforward as SPT utilises detailed project costing templates with defined areas where risk uplift factors can be applied, which are highly visible. In general, Arcadis confirmed risk uplift factors in the project costing templates had been set at zero before apportionment to the various cost categories contained within the RIIO-T2 Business Plan Data Tables (BPDT).

The original 2019 assurance exercise observed that SPT has developed a highly disaggregated approach to project costing to produce a Prime cost estimate for each project. This approach has been reconfirmed as part of this risk review, where a different subset of RIIO-T2 projects costs were reviewed. The recording of asset costs on a disaggregated basis enables SPT to build Prime cost estimates on a granular bottom-up basis. This costing approach requires SPT to maintain comprehensive records of project costs components, which are stored in a 'Manual of Standard Costs (MoSC)'.

Therefore, a fundamental requirement of this review was to investigate the sources of cost data recorded in SPT's MoSC and to determine whether MoSC data included or excluded risk contingency uplift factors. Having investigated the sources of MoSC data, Arcadis then sought to confirm the application of MoSC for a range of LRE and NLRE projects for different asset categories to determine appropriate Prime costs. Arcadis also checked the apportionment of Prime costs within the RIIO-T2 BPDTs.

After producing Prime project cost estimates using the MoSC, SPT determines representative risk uplift factors to be applied to Prime costs to capture SPT's delivery risks. SPT's approach to project risk assessment is to quantify the risks applicable to each project at a disaggregated level. These risks form part of approval processes and are refined during the various gate stages (e.g. IP3/4/5) as projects progress through to final approval.

During the project delivery phase, risk contingency amounts can be released, subject to formal approval. SPT also undertakes reviews of all risk related costs upon project completion to inform future project risk

[2] Prime costs are project costs presented net of risk contingency amounts, return allowances and on-costs.

cost estimates. Arcadis was provided with evidence of this disaggregated approach to risk quantification, contingency approval and outturn analysis as part of this risk review.

1.2 RIIO-T3 Risk Exclusion and Capping Mechanisms

Arcadis provides detailed risk assessment and quantitative risk analysis across a range of industry sectors and for major capital projects. These services extend to the deployment of Risk Managers within client project teams throughout project delivery, assessment and management of risk registers, development of risk management plans and the application of probabilistic techniques to risk quantification.

Our Risk Managers are highly familiar with the types of risk and the uncertainties facing major project delivery and the implementation of appropriate risk mitigation measures. These managers therefore have a detailed understanding of how and when risk exposures typically arise during the project lifecycle. They also have detailed knowledge of disaggregated components of project risk, representative uplift percentages for different project types and how risk exposures change throughout project delivery.

Arcadis Risk Managers are therefore well qualified to comment on the robustness of Ofgem's risk related interventions contained in the RIIO-T2 Draft Determinations, particularly regarding the exclusion of risk from Lead and Non-Lead Assets, and the projects scheduled to complete in the RIIO-T3 period.

Arcadis has also checked the accuracy of Ofgem's implementation of the risk exclusion and capping mechanisms in the RIIO-T2 Draft Determinations for SPT as part of this review.

2 SPT Manual of Standard Costs (MoSC)

2.1 Inputs to SPT's MoSC

Given the materiality of the interventions arising from the removal of the Lead and Non-Lead asset risk component in the Draft Determinations, Arcadis has undertaken a comprehensive review of SPT's input sources utilised for project cost estimation. The project cost estimates produced for the RIIO-T2 investment plan were derived from SPT's MoSC as described above.

SPT's MoSC provides reference base prices for the full range of transmission projects, which includes equipment supply, installation, associated civil works and direct costs. The MoSC comprises asset category specific spreadsheets containing recent cost information from suppliers and contractor organisations. These spreadsheets contain disaggregated cost data for equipment supply and installation for a particular asset category and transmission voltage. The MoSC therefore contains several reference spreadsheets from which granular bottom-up project cost estimates can be produced. The MoSC has been used to provide cost estimates for the projects in the RIIO-T2 investment plan and therefore ensures that a consistent approach to cost estimation has been followed for the SPT investment portfolio.

As the equipment and installation requirements for different types of transmission project vary considerably (e.g. the scope of work for a substation project is fundamentally different to that of an overhead line), the structure of the relevant MoSC spreadsheets also vary according to asset category to reflect the relevant cost drivers. The amount of data in each MoSC spreadsheet also varies according to the number of representative comparator projects undertaken in recent years. The level of input cost disaggregation varies by asset category, linked to contracting strategy as discussed further below. The MoSC therefore comprises separate spreadsheets for overhead line works, switchgear projects, transformer and reactor replacements, cable projects and synchronous compensation equipment.

Inputs to each MoSC spreadsheet are derived from a variety of sources, largely dependent on asset category. Arcadis has confirmed that MoSC costs originate from the procurement phase of project development and that such costs are typically derived from the following sources for each of the asset categories listed in Table 2. A more comprehensive summary of MoSC data sources for the different types of transmission project is provided in Appendix A.

Table 2 - Typical Procurement Phase Input Cost Sources in MoSC

Input Cost Source	Example Asset Category
Framework Rates	Transformers
Tender Prices including Best & Final Offers (BAFO)	Overhead line works
RIIO-T1 Contract Award Values	Substation Refurbishments
Indicative supplier costs from Requests for Information (RFIs)	Synchronous compensators
Historic prices from TPCR4 and RIIO-ED1 - adjusted for inflation	Protection assets

Where a broad dataset is available for a particular asset category from a range of suppliers, MoSC values are derived from averages following removal of any outlier values to avoid distortions. This approach is also shown in Appendix A, which provides the MoSC extract for 275kV overhead line conductors, where the average benchmark value expressed in £k/Route.km is calculated from the average of normalised BAFO values after removal of the highest and lowest contractor offers. This average of the normalised values following removal of the outliers is then indexed to adjust for inflation. Such disaggregated recording of asset costs in the MoSC enables SPT to build cost estimates on a granular bottom-up basis.

A key factor to recognise from the data reviewed is that MoSC input costs have been derived from the procurement phase of project development rather than post-delivery outturn values. Arcadis has not identified any circumstances in which MoSC input costs have been derived from project outturn costs. The use of such outturn costs would implicitly include additional contingency amounts allocated to unforeseen delivery requirements and would thus negate requirements to apply any additional risk uplift factors.

Arcadis has reviewed MoSC cost inputs from equipment supply frameworks, tenders, contract awards / BAFOs and RFIs and found no evidence of risk contingency inclusion in these data sources. Therefore, any risk related costs encountered during delivery are not captured in MoSC derived project cost estimates, although such additional costs may be incurred by SPT. Arcadis therefore regards the application of project-specific risk uplift percentages to cost estimates derived from MoSC data as an appropriate means of capturing the delivery risk expenditure being managed by SPT.

Arcadis has reviewed the uplift percentages applied by SPT across the portfolio of all LRE and NLRE projects. The uplift percentages applied to LRE projects are typically in the range 8.3% - 9.1% with a small number of outliers that increase the average uplift percentage to 10.1% overall. The equivalent range of uplift percentages applied to NLRE projects is broader, typically between 3.0% and 19.5% with an overall average of 7.5%. Arcadis regards the range of risk uplift percentages applied to LRE and NLRE projects as reasonable and representative given variations in project complexity and stage of project development.

2.2 Contracting and Delivery Strategy

The level of risk being assumed by GB Transmission Owners (TOs) during project delivery is influenced by each TO's contracting strategy. Where TOs adopt Engineering, Procurement and Construction (EPC) or Turnkey approaches, a high proportion of risk will be transferred to supplier and contractor organisations, which will be reflected in tender and contract prices.

For the RIIO-T1 and T2 periods, SPT has pursued an increasingly disaggregated contracting approach using multiple suppliers and contractors to deliver projects. This strategy is designed to encourage supply chain competition and enable a broader range of contractors to participate in procurement events, with the objective of reducing overall project costs. The level of disaggregation adopted by SPT varies by project type and value. Further disaggregation has been achieved through the use of SPT (Iberdrola) framework agreements for equipment supply, where equipment is made available 'free of charge' to the appointed installation contractor, e.g. transformers and switchgear.

By continuing to adopt a disaggregated contracting strategy for RIIO-T1 and T2 project delivery, SPT is seeking to minimise the risk exposures of supplier and contractor organisations. However, this approach requires SPT to undertake additional design[3] and project management activities inhouse. Therefore, under

[3] Concept and detailed design

this disaggregated model, SPT assumes a higher level of design and delivery risk relative to EPC-based approaches and neither these costs, nor client risks are captured in the MoSC. This disaggregated contracting strategy and the resultant increases in SPT risk exposures further reinforces the validity of applying risk contingency uplift factors to MoSC derived project cost estimates.

2.3 Exclusion of Risk Contingency from RIIO-T3 Projects

In the RIIO-T2 Draft Determinations, all risk contingency amounts have been disallowed from the SPT investment plan for projects scheduled to complete in the RIIO-T3 period. This applies to all projects where delivery spans the RIIO-T2 and RIIO-T3 periods.

Analysis of the LRE and NLRE projects spanning RIIO-T2 and T3 reveals that the majority are scheduled to commence construction late in the RIIO-T2 period and continue into the early years of RIIO-T3. For some of the larger LRE schemes, the bulk of the expenditure is currently scheduled to be incurred during the RIIO-T3 period. Arcadis agrees that it would not be appropriate to include the full risk contingency allowance in RIIO-T2 investment plan for projects spanning both periods. However, Arcadis does not agree that it is appropriate to exclude all risk allowances for spanning projects from RIIO-T2 allowances.

Removal of risk contingency amounts from projects spanning the RIIO-T2 and T3 periods fails to recognise that risk exposures inevitably arise throughout the project lifecycle including in the early stages of a project (e.g. unforeseen ground, archaeological or environmental conditions) rather than upon project completion.

Arcadis regards Ofgem's intervention that removes all risk contingency amounts from RIIO-T2 allowances for projects with partial investment requirements in the RIO-T3 period to be unjustified and overly simplistic. Arcadis believes that the inclusion of some risk contingency provision in RIIO-T2 Totex allowances remains appropriate to reflect SPT risk exposures early in the project delivery cycle.

A more equitable, straightforward and low financial impact solution would be to allocate risk contingency amounts in line with the forecast project expenditure profile. This would result in projects that incur the majority of expenditure in the RIIO-T2 period retaining a high proportion of risk contingency allowances. Conversely, projects incurring the majority of expenditure in the RIIO-T3 period would only be allocated a small proportion of the risk contingency amount in the RIIO-T2 period.

2.4 Non-Asset Risk Capping at Portfolio Average Values

In the RIIO-T2 Draft Determinations, Ofgem implemented a low materiality risk capping mechanism for non-asset related costs including the cost of civil works. This mechanism caps non-asset risk for each project allowed at Draft Determination stage at an average risk percentage calculated across the full investment portfolio. As stated in the Introduction above, the value of this non-asset risk capping intervention is very low at approximately £0.3M over 5-years. Given this low materiality, the mechanism proposed in the Draft Determinations appears disproportionate and overly complex.

This intervention does not recognise the benefits of disaggregated project risk quantification and applies a backward step of capping risk allowances at an arbitrary and non-project specific average level. The impact of this intervention effectively retains risk allowances for low risk projects, whilst disallowing risk allowances that are higher than average percentage for higher risk projects. The supporting rationale for this intervention is not provided.

Arcadis also notes that the average capping percentage is derived from all RIIO-T2 and T3 projects, irrespective of whether the projects were approved or disallowed in the Draft Determinations. Arcadis regards the application of an average risk percentage calculated from approved and disallowed projects as inconsistent on the basis that any cap should derived from the subset of projects that will be impacted by its application.

Arcadis regards the rationale for this intervention to be flawed from both logical and implementation perspectives. Possibly as a result of this disproportionate complexity, Arcadis has also identified errors in the application of this capping mechanism, which further erodes confidence in this intervention. These errors include:

- The Stage 1 calculation of the percentage of total costs arising from 'Civils', 'Other' and 'Indirects' is incorrect for 20 LRE projects where arbitrarily low percentages have been inserted;
- The Stage 1 calculation for a particular LRE project (SPT200107) where the percentage of the total cost allocated to 'Civils', 'Other' and 'Indirects' incorrectly includes Non-Lead Asset costs; and
- Stage 3 calculation of the average (non-weighted) risk percentage for LRE projects incorrectly shows the average NLRE risk percentage for 20 projects.

As this capping mechanism cannot be justified from a logical, proportionality or an implementation complexity perspective, Arcadis recommends removal of this mechanism.

3 Conclusions

Ofgem's RIIO-T2 Draft Determinations issued in July 2020 contained a number of investment plan interventions, which significantly reduced the overall value of the SPT investment plan. Key interventions related to reductions in the risk contingency amounts allocated to project cost estimates for both LRE and NLRE projects. These risk related reductions equate to £43.7M for SPT over the 5-year price control period and were the result of the following 3 interventions mechanisms.

A. Exclusion of all Risk Contingency Amounts for Projects scheduled to complete in the RIIO-T3 period;
B. Removal of Risk Contingency Amounts from Lead and Non-Lead asset costs for justified projects; and
C. Capping Risk for non-asset costs at the average portfolio risk percentage calculated for the full project investment portfolio.

The removal of all asset risk (B) from the approved LRE and NLRE projects at the Draft Determination stage was the most significant intervention and resulted in an allowance reduction of £37.8M, equating to >85% of the total risk related reductions. The basis of this reduction by Ofgem was that SPT's project cost estimates had been based on historic project outturn costs and therefore already contained risk allowances.

This review has confirmed that SPT project cost estimates have been derived from SPT's Manual of Standard Costs (MoSC). The MoSC contains normalised and disaggregated project cost reference values obtained largely from framework rates, tenders, contract values and indicative equipment prices from suppliers. Arcadis has established that the inputs to the MoSC originate from the procurement phase of project development rather than project outturn costs.

During the review of MoSC input costs, Arcadis has not identified the application of any risk uplift percentages and therefore regards the application of project-specific risk uplift percentages as an appropriate means of capturing SPT's delivery risk exposures. Arcadis also recognises that SPT's contracting approach seeks to minimise supplier / contractor risk although this approach also increases SPT delivery risk exposures.

It can be concluded that the removal of Lead and Non-Lead asset risk in the Draft Determinations does not adequately capture SPT's project delivery risks. Arcadis does not agree with Ofgem's removal of (B) Asset Risk contingency amounts in the RIIO-T2 Draft Determinations and therefore concludes that the application of risk uplift factors to Lead and Non-Lead asset costs remains appropriate and should be reinstated.

With respect to the exclusion of project risk for projects spanning the RIIO-T2 and T3 periods (A), and the capping of non-asset risk (C), Arcadis does not support either of these interventions and regards both mechanisms as unjustified for the following reasons.

Removing or deferring risk from projects spanning into the RIIO-T3 period does not recognise that risk exposures occur throughout the project lifecycle (often in the early stages of a project), rather than upon project completion. Arcadis recommends a more equitable solution where risk contingency allowances are allocated in line with the forecast project expenditure profile.

Arcadis regards the capping of non-asset risk as proposed in the Draft Determinations as unnecessarily complex and disproportionate. This intervention fails to recognise the disaggregated nature of project risk quantification and applies a backward step of capping risk at an average (non-project specific) level. As this capping mechanism cannot be justified from a logical or implementation perspective, Arcadis recommends removal of this mechanism.

APPENDIX A

Manual of Standard Costs – Data Sources by Asset Type

Asset Category	MoSC Location	MoSC Cost Source
132kV UG Cable (Oil)		[redacted]
132kV CB (Air Insulated Busbars) (ID)	Substations - New Build - 132 AIS_SBB/DBB	
132kV Switchgear - Other	Substations - New Build - 132 AIS_SBB/DBB 132 AIS_WF_Sub 132 AIS_GSP_Refurb_1xTX/2xTX 132 AIS_CBBay	
275kV CB (Gas Insulated Busbars) (ID)	Substations - New Build - 275 GIS_DBB	
275kV Switchgear - Other	Substations - New Build - 275 GIS_SwGear 275 AIS_GSP_Refurb_1xTX/2xTX AIS Main Plant 275 AIS_DBB	
400kV Switchgear - Other	Substations - New Build - AIS_MainPlant 400AIS_DBB	
132kV Fittings	OHL - New Build - L4 construction rev8, L7 Construction rev7 Refurbishment - Generic 132 kV Line cost Final Rev01	
275kV Fittings	OHL - New Build - L8 construction rev2 Refurbishment - Generic 275-400kV LINE COST Final Rev5	
400kV Fittings	OHL - New Build - L8 construction rev2 Refurbishment - Generic 275-400kV LINE COST Final Rev5	
132kV OHL (Tower Line) Conductor	OHL - New Build - L4 construction rev8, L7 Construction rev7 Refurbishment - Generic 132 kV Line cost Final Rev01	
132kV Tower	OHL - New Build - L4 construction rev8, L7 Construction rev7 Refurbishment - Generic 132 kV Line cost Final Rev01	
275kV OHL (Tower Line) Conductor	OHL - New Build - L8 construction rev2 Refurbishment - Generic 275-400kV LINE COST Final Rev5	
275kV Tower	OHL - New Build - L8 construction rev2 Refurbishment - Generic 275-400kV LINE COST Final Rev5	
400kV OHL (Tower Line) Conductor	OHL - New Build - L8 construction rev2 Refurbishment - Generic 275-400kV LINE COST Final Rev5	
400kV Tower	OHL - New Build - L8 construction rev2 Refurbishment - Generic 275-400kV LINE COST Final Rev5	
Protection Schemes	Substations - Protection 33 kV Indoor CB	
33kV OHL (Pole Line) Conductor	This is not included within MoSC	
33kV Pole	This is not included within MoSC	
Pilot Wire Underground	Cable - New Build - 33kV and 132 kV	
275kV Reactor	Substations - New Build - 33kV Series Reactor	
400kV Reactor	Substations - New Build - 33kV Series Reactor+400kV Shunt Reactors (x1)	
132kV FACTS Equipment	Substations: New Build Harmonic Filter - RFI issued Other costs -132 AIS_SBB	
400kV FACTS Equipment	N/A - RFI Issued	

MoSC 275kV Overhead Line Conductor Cost Derivation

Miscellaneous Items	XV Route: 36 km (72 cctkm), 101 Towers (L2,L8);400 kV; 1st November 2012, Sagged at 90 C	YD Route: 2.44 km (6 cctkm): 8 Towers: 275 kV (IP3 Stage 1 24/05/12), Sagged at 50C.	XS Route; 37 cctkm, 58 towers; 275 kV (BAFO 2013), sagged at 90 C	XG/XQ Route; 72.2 cctkm, 107 towers; 275 kV (BAFO 2013), sagged at 90 C	XE Route; 37 cctkm, 57 towers; 275 kV (BAFO 2013), sagged at 90 C	WA Route 275 kV OHL; 14,436 km Route lenght; January 2013 (BAFO)	YH Route 275 kV OHL; 8 km Route lenght; August 2015 (BAFO)	YG Route 275 kV OHL; 3.15 km Route length (not considering diversion); July 2016 (BAFO)	YX/YW Route 275 kV OHL; 84.67 km Route length; July 2016 (BAFO)	FINAL PRICE (2016 prices)	FINAL PRICE (2017/18 prices)
	£/Tower	£/Tower	£/Tower	£/Tower	£/Tower	£/Tower	£/Tower	£/Tower	£/Tower	£/Tower	£/Tower
Visual inspection, condition assessment and report. Pre-works visual inspection and condition assessment, include report. Foundation cap and muff inspection, include report.	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Foundation cap/muff removal and concrete replacement including painting. Foundation cap and muff removal and concrete replacement, including application of bitumastic paint to concrete and first 150mm of steelwork.	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Foundation muff painting, application of 3 coats of bitumastic paint to concrete and first 150mm of steelwork.	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Replace existing step bolts	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Replacement/ Upgrade of Tower furniture. New ACD, Circuit plates, Property Plates, Route and Tower number plates, Danger of death Notices, flag brackets and flag sockets, helicopter plates...	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Replacement of tower steelwork to TGN(E) 161 Suspension and tension towers, replacement of tower steelwork/bracings, plates, bolts etc to TGN (E)161 including all temporary supporting steelwork/stays required for installation. All new steelwork to be painted following installation (Include in rates). Rates to include all site drilling of existing bars and application of protective coating of metaflex or similar.	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Design: (per tower) -Carry out tower design assesment as a result of replacing zebra conductor with Totara - Produce generic wire clearance drawings. - Downleads drawings. - Draughtsman nad engineer engaged in specialist drawings. - Produce and maintain copies of all 3rd party utility drawings	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Arcadis Consulting (UK) Limited

Apex 3,
95 Haymarket Terrace
Edinburgh EH12 5HD
United Kingdom

T: +44 (0)131 347 3800

arcadis.com