SPNLT20272 Environmental Civil Asset Upgrades

Issue 1.0

11/12/24

ENVIRONMENTAL CIVIL ASSET UPGRADES			
Name of Scheme	Environmental Civil Asset Upgrades		
Investment Driver	Asset Health		
BPDT / Scheme Reference Number	SPNLT20272		
Outputs	• Civils – Wound Plant – Transformer - 132kV <= 90MVA • Civils – Wound Plant – Transformer - 275kV >= 240MVA • Civils – Wound Plant – Transformer - 275kV < 240MVA		
Cost	£15.94M		
Delivery Year	2027 - 2031		
Applicable Reporting Tables	5.1_Project_Meta_Data, 7.1_Scheme_C&V_NonLoad_Actuals, 10.2_Asset_ID, 10.3_Site_ID, 11.10_Contractor_Indirect		
Historic Funding Interactions	N/A		
Interactive Projects	N/A		
Spend Apportionment	**ET2**	**ET3**	**ET4**
	£1.30M	£14.64M	£0.00M

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1. Introduction

As part of the RIIO-T3 programme of works, SPT has a transformer refurbishment programme. This programme addresses the health of the transformer ancillary components to allow the remaining life of the transformer active part to be fully realised. Typically, these transformers were installed at a time when the oil containment standards were less rigorous and therefore the bunds are designed to retain the transformer oil for a short period of time unlike the current standard.

The RIIO-T2 civil condition surveys have also identified bunds for refurbishment in RIIO-T3 based on condition. This programme is to bring the oil bunding and associated drainage up to current standards and to remediate any soil contamination issues which may be present.

This paper supports a proposal to undertake a programme of works to replace and refurbish elements of the existing transformer bunds and associated oily water drainage systems which are in poor condition.

SPT maintenance schedule has identified a number of transformer bunds which do not currently meet current standards and are targeted for intervention during the RIIO T3 programme of works. Please refer to the list below:

Period	Item	Site Name	Voltage	MVA
T3	1	Marshall Meadows T1	NR132/25	10/14
T3	2	Marshall Meadows T2	NR132/25	10/14
T3	3	Partick T2	132/33	60
T3	4	Glenluce T1	132/33	60
T3	5	Glenluce T2	132/33	60
T3	6	Newarthill SGT1 + ETX	275/33	120
T3	7	Newarthill SGT2 + ETX	275/33	120
T3	8	Glenlee Spare	132/11	30
T3	9	Glenlee T1 + ETX	132/11	30
T3	10	Hunterston Farm T1 + ETX	132/33	60
T3	11	Hunterston Farm T2 + ETX	132/33	60
T3	12	Clydesmill SGT1 ETX*	33/LV	0.3
T3	13	Clydesmill SGT2 ETX*	33/LV	0.3
T3	14	Dalmarnock SGT1	275/132	240
T3	15	Dalmarnock SGT2	275/132	240
T3	16	Smeaton SGT1	275/132	240
T3	17	East Kilbride South SGT1	275/33	120
T3	18	East Kilbride South SGT2	275/33	120
T3	19	Berwick T1	132/33	60
T3	20	Berwick T2	132/33	60
T3	21	Currie SGT1A	275/132	240
T3	22	Currie SGT2A	275/132	240
T3	23	Tongland T1A + ETX	132/11kV	30
T3	24	Tongland T2A + ETX	132/11kV	30
T3	25	Tongland T1BA +EXT	132/33kV	60
T3	26	Tongland T2B + EXT	132/33kV	60
T3	27	Ayr SGT1	275/33kV	120

**The location of the existing auxiliary transformer positions at Clydesmill and the footprint of the new bund will mean that the footprint of the new bund will be on top of the location of the existing cable. As a result, this will mean that a new 33kV cable will need to be installed in a route around the bund to allow for future maintenance.*

The delivery of these projects will be staged over a number of outage periods between 2026 and 2031. It should be noted that due to the condition of the existing bunds and oily water drainage systems, it is expected that these refurbishment works will continue into RIIO T4.

2. Background Information

This paper supports a proposal to replace 25 Transformer bunds and 11 Auxiliary bunds with a bund arrangement to extend the lifespan of the transformer bund in line with the transformer itself. The civil assets are classed as non-lead assets. However, SPT have an asset management system in place to ensure that these assets are inspected, recorded and managed from a risk perspective.

Transformer bunds are used to contain water and oil. Traditionally bunds were constructed of concrete and brick, concrete or brick with a sump to collect the mix of oil and water. The oily water drainage system consists of:

- A sump collects the water and a pump is positioned in the sump to pump the water through a number of drainage pipes which transfer the oily water to an oil/water separator.
- An oil/water separator separates the oil and water and discharges the water whilst retaining the oil.
- The water discharged is to be class 1 which is normally discharged to ground or alternatively it can be discharged to a water retention area. The water is then discharged to the water course over a period of time.

A comprehensive programme of civil inspections has been undertaken across the network. The inspections have revealed that at several sites the transformer bunds and associated oily water drainage systems are in a deteriorated condition [redacted]. Without intervention, these assets will degrade to a point where they cannot be repaired and will fail. This is then likely to lead to an environmental incident, polluting the local environment.

2.1. Data Collection

As part of the substation inspection regime, a detailed site review and technical assessment of the condition of the lead and non-lead assets has been carried out.

SPT has a strategy with civil assets to visually inspect annually and intervene when asset condition requires. This has been a historical approach as transformer bunds and oily water drainage systems have been seen as maintenance free and expected to be replaced in line with the main asset they support. As the life of the main plant has been extended through evolution in technologies, mid-life interventions and improved maintenance regimes, the required life of the associated civil assets also requires to be examined.

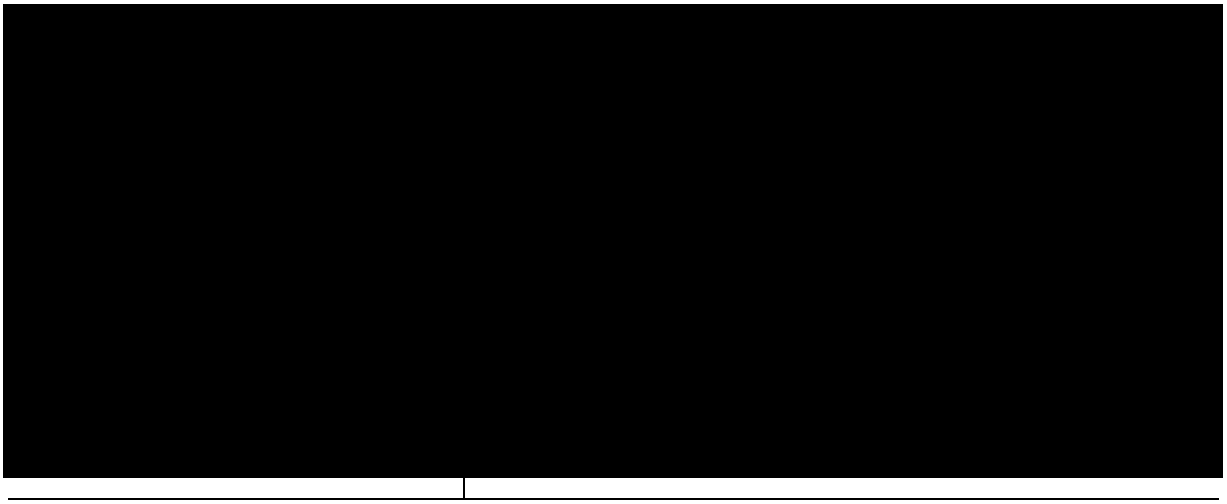
As part of the RIIO-T2 business planning process, SPT undertook condition assessments of a number of sites constructed prior to 2000, to determine the health index of the Civil Assets and to allow the development of a programme to deliver targeted refurbishment to the civil assets either at or approaching end of life, to ensure no in-service failures. For the refurbishment programme 125 bunds at 82 sites were identified in the condition survey as in need of refurbishment. These were prioritised by risk and 29 sites were remediated during the T2 period. Out of the remaining 53 sites, 14 of these have been taken forward for refurbishment in the T3 period where a total of 27 bunds will be refurbished. The remaining 36 sites which have a total of 39 bunds will be refurbished as part of the T4 period.

The assessment for transformer bund refurbishments for RIIO-T3 has been based on the RIIO-T2 civils condition surveys. Like the assessment of primary plant, a visual inspection has been carried out on the existing civil assets, including existing concrete structures and foundations, to determine the condition of these assets. This survey has identified a number of bunds which are non-compliant.

These sites were selected as it was acknowledged that any site constructed post 2000 would use assets that would only just be approaching mid-life at present, and as such should not require any interventions at this stage.

See below examples of non-compliant reports attached:

[redacted]



[redacted]

2.2. Condition Assessment

2.2.1. Methodology Approach

A comprehensive programme of civil inspections has been undertaken across the network and it has been identified through these inspections that at a number of sites the transformer bunds and associated oily water drainage systems are in a poor condition and [redacted].

Further to this SPT undertook a desktop review of the environmental sensitivity of each site to determine the high, medium and low risk sites and prioritise the programme of works.

2.2.2. Outputs from Assessment

Through the detailed and comprehensive inspection SPT has been able to determine a Health Index for all of the civil assets on each site. These surveys covered approximately 21,000 civil assets, each of which has been assigned a Health Index consistent with the standard SPT range of 1 to 5. Health Index 1 is considered to be new or as new and Health Index 5 is end of life.

Through these inspections a number of transformer bunds and oily water drainage systems across these substations have been identified as being in Health Index 4 or 5. This means that the assets are either at or approaching End of Life and in need of replacement/refurbishment.

These works will commence in the RIIO-T3 period following co-ordination of these works with our transformer refurbishment works. Following [redacted] it has been proposed that SPT will start with transformers with a Health index of 4 or 5 within substations identified as being high environmental risk.

We have developed a programme of works which prioritises substations based on:

- The Health Index of the transformer bunds and oily water drainage systems;
- The environmental risks associated with the substation;
- Alignment with our transformer replacement and refurbishment programmes;

We anticipate that to align with our transformer replacement and refurbishment programmes and due to network constraints, this programme of work will continue beyond RIIO-T3.

Without intervention these assets will degrade to a point where they cannot be repaired and will fail, with the potential to lead to an environmental impact on the natural environment.

The table below provides a breakdown of the quantities associated with these works.

Voltage (kV)	No of Transformer bunds being refurbished	No of Oil interceptors being replaced	Total No of Sites
33	2	2	**1**
132	15	15	**7**
275	10	10	**6**
Total	**27**	**27**	**14**

3. Optioneering

This section provides a description of each intervention option and details the key considerations. A summary of each option is described at the end of this section.

The primary aim of this project is to refurbish end of life assets prior to failure.

Options proposed below apply to all the transformer bunds identify within this Engineering Justification Paper.

3.1. Baseline, defer to RIIO-T4

A 'Do nothing' option has been considered to represent ongoing maintenance and repair as part of business as usual, with the transformers then being refurbished during RIIO-T4. This option involves the minimum level of intervention required to remain compliant with all relevant safety and legal requirements.

The intervention timeline considered within this option is summarised below:

- RIIO-T3 (2027-2031): Ongoing operational activities.
- RIIO-T4 (2032-2036): In situ transformer bunds refurbishment.

3.2. Option 1: Refurbishment of transformer bunds

This option considers in situ refurbishment of the existing transformer bunds during RIIO-T3:

- RIIO-T3 (2027-2031): In situ transformer bunds refurbishment.

3.3. Option 2: Replacement transformer bund units in RIIO-T3

This option considers the transformer bunds replacement during RIIO-T3, with the scope including:

- RIIO-T3 (2027-2031): Replacement of the oily water drainage system has been considered.

The following table provides a summary and comparison of the options considered for this project:

Options	Map	Layout of Substation / Connection	Layout of all Route Works	Relevant Survey Works	Narrative Consenting Risks	Narrative Preferred Option	Narrative Rejection
Rejected - Baseline option: Do nothing in RIIO-T3, with investment deferred to RIIO-T4. Scope of works like Option 1.	N/A	See Appendix A	N/A	N/A	N/A	N/A	The first option in this case would be do nothing within RIIO-T3. Through inspection and condition assessment, the transformer bunds detailed in this paper were identified for refurbishment as part of this scope of work. As a result, the option to do nothing within RIIO-T3 is not acceptable as the current condition of the assets and ongoing degradation will lead to an in-service failure.
Preferred - Option 1: Refurbishment of existing transformer bund units.	N/A	See Appendix A	N/A	N/A	N/A	Refurbishment of the transformer bunds has been determined to be the most cost-effective solution and this is the solution that SPT are proposing to use. Refurbishment of the oily water drainage systems has been considered but the oil interceptors cannot be refurbished to ensure [redacted]. As a result, a new oil/water separator is to be installed in line [redacted]. However, the whole bunding system is not being replaced, so this is regarded as refurbishment.	N/A
Rejected - Option 2 Replacement transformer bunds units during RIIO-T3.	N/A	See Appendix A	N/A	N/A	N/A	N/A	This is not the most cost-effective solution, since it cannot be built in-situ, will require the Transformer to be removed, take longer to construct. Replacement of the oily water drainage system has been considered. Due to the simplistic construction of the oil interceptors these cannot be reused or refurbished and therefore need to be replaced to allow [redacted].

3.4. Selected Option

Option 1 achieves the main objective of refurbishing the identified transformer units during the RIIO-T3 period reducing risk on an asset type deemed at its end of life.

The refurbishment of the existing bund and replacement of the oily water drainage system has been considered to be most cost-effective approach. Due to the simplistic construction of the oil interceptors these cannot be reused or refurbished and therefore need to be replaced to allow SPT to comply with [redacted] however this is classed as refurbishment as the whole system is not being replaced. The refurbishment option will reduce carbon output, construction costs (as existing foundation can be used), quick construction turn-around and versatile design and able to adapt to site specific conditions.

4. Costs

Preferred option 1 considers refurbishment of transformer bund units as identified earlier through condition data, data analysis and interrogation.

4.1. Estimated Total Project Cost

A Business Plan provision and estimated cost of the project is indicated in the following table. These costs include associated Contractor Indirect. To be referred to tables "7.1_Scheme_C&V_NonLoad_Actuals" and "11.10_Contractor_Indirect".

Project costs are summarised in the Cost Breakdown below:

Item	Description	Estimated CAPEX (£m 23/24)
1	Civils - Transformer 132kV <= 90MVAEach [Bund Refurbishment]	[redacted]
2	Transformer 275kV < 240MVAEach [Bund Refurbishment]	
3	Transformer 275kV => 240MVAEach [Bund Refurbishment]	
4	33kV Cable [Supply-Install-Civils]	
5	Preliminaries and Site Establishment	
6	Risk	

Expenditure incidence is summarised below:

Estimated CAPEX value per year, £m, 23/24 price base									
Energisation Year	Yr. 2026: CAPEX	Yr. 2027: CAPEX	Yr. 2028: CAPEX	Yr. 2029: CAPEX	Yr. 2030: CAPEX	Yr. 2031: CAPEX	**RIIO-T2 Total: CAPEX**	**RIIO-T3 Total: CAPEX**	**Total: CAPEX**
2027-2031	1.30	2.73	3.50	3.60	3.03	1.79	1.30	14.64	15.94

4.2. Regulatory Outputs

The primary asset outputs are identified in table below:

Asset	Intervention	Volume	Delivery Year
Civil – Wound Plant – Transformer - 132kV <= 90MVA	Refurbishment	15	2027-2031
Civil – Wound Plant – Transformer - 275kV >= 240MVA	Refurbishment	5	2027-2031
Civil – Wound Plant – Transformer - 275kV < 240MVA	Refurbishment	5	2027-2031
Substation Cable - >=3 core per phase	Replacement	2	2027-2031

5. Deliverability

SPT's project management approach has been applied to ensure that this project work is delivered safely, and in line with the agreed time, cost and quality commitments. We have a proven track record of delivering essential transmission network upgrade projects and will draw upon this knowledge and experience to effectively manage these works. A dedicated Project Manager will be assigned to the works at every stage who is responsible for overall delivery of the scope and is the primary point of contact for all stakeholders.

5.1. Delivery Schedule (Level 1 Programme)

A standard approach has been applied to the planning phase of these works and that will continue for the reporting and the application of processes and controls throughout the lifecycle. Table below summarises the key milestones within the delivery schedule.

Item	Project Milestone	Estimated Completion Date*
1	IP-2	2024
2	SCA/ITT Documents	2025
3	Tender Process	2025
4	IP3 Stage 2	2026
5	Commence Site Works	2026
6	Complete Site Works	2030
7	Estimated Project Close Out	2031

**calendar dates*

Regular meetings with the Project and Construction Management Teams shall be undertaken to assess the ongoing effectiveness of the Project Management interfaces.

The Project Manager will facilitate internal Project Team Meetings, in which project progress and deliverables will be reviewed and any arising risks or issues will be discussed and addressed.

5.2. Risk and Mitigation

A Risk Register would be generated collaboratively during the initial design stages to identify any risks, which if realised, could result in deviation from the delivery plan. Mitigation strategies would also be developed to manage the risks identified and these will be implemented by the Project Manager. The risk register shall remain a live document and will be updated regularly. Currently, the top scheme risks are:

- Network access restrictions: Wider issues on the network restricting available capacity. Co-ordinate with OCC to ensure outage plan takes into consideration the impact of delayed outages.
- Asbestos: Unknown asbestos content is within existing bunds. Detailed asbestos survey to be carried out at start of the project. Specialist contractor to be considered for any asbestos removal works.
- Dismantling in close proximity to energised circuits. Requirements of regular proximity outages has the potential of delaying programme: Demolition stages to be planned in advance of actual works.
- Project delays resulting in significant impact on network stability and increase constraint costs substantially.

5.3. Quality Management

SPT adopts a “life cycle” approach to Quality Management in major project delivery. Our Management Systems are certified to ISO 9001, ISO 14001 and ISO 45001. Various areas applicable to these standards ensure a quality product is delivered. The significant areas detailed below:

5.3.1. Quality Requirements During Project Development

Any risk or opportunity that may affect the quality of the product are detailed in the Project Risk Register.

The suppliers of main equipment may also receive a Factory Acceptance Test Inspection when the asset is being built.

5.3.2. Quality Requirements in Tenders

Each contract that SPT issues has a standard format. Specifically in relation to quality, this will include a Contractors’ Quality Performance Requirement (CQPR). This CQPR represents a specification that details roles and responsibilities for all parties during the works, frequency and format of reporting. It will also specify the document management process to be adhered to during the delivery of the project. In addition to the CQPR, each project has a contract specific Quality Management Plan, detailing the inspection and testing regime for works as well as the records to be maintained.

5.3.3. Monitoring and Measuring During Project Delivery

SPT Projects undertake regular inspections on projects and contractors to monitor and measure compliance with SPT Environmental, Quality and Health and Safety requirements, as detailed in the contract specifications for the work. All inspections are visual, with the person undertaking the inspection ensuring that evidence of the inspection and any actions raised are documented.

The following inspections are completed:

- Quality Inspections (monthly)
- Environmental Inspections (monthly, with weekly review by third party Environmental Clerk of Works)
- Safety Assessments & Contractor Safety Inspection (daily, with full time Site Manager)
- Project Management Tours (monthly)

The scope of audits and Inspections is to determine compliance with:

- Procedures & Guides
- Planned arrangements for ISO 9001, 14001 & 18001
- Legal and other requirements.

5.3.4. Post Energisation

SPT Projects and SPT Operations carry out a Defect Liability Period Inspection within the Contract Defect Liability Period with the aim of identifying any defects and rectifying them with the contractors.

5.4. Environmental and Wayleave Considerations

5.4.1. Environmental Planning

Not applicable for this scheme. All works contained within substation footprint.

5.4.2. Wayleave Issues

Not applicable for this scheme. All works contained within substation footprint.

5.4.3. Environmental Sustainability

ENV-01-007 encompasses all activities undertaken within and in support of SP Energy Networks three Licences. This includes operational and business support functions concerned with management of SP Transmission, SP Distribution and associated regulatory and commercial interfaces, products, services and their associated environmental, social and economic impacts. The policy makes the following commitments which shall be respected in any works associated with this scheme.

"SP Energy Networks will incorporate environmental, social and economic issues into our business decision-making processes, ensuring compliance with or improvement upon legislative, industry, regulatory and other compliance obligations. We will deliver this by being innovative and demonstrating leadership on the issues which are important to us and our stakeholders, and will:

- Ensure the reliability and availability of our Transmission and Distribution network whilst creating value and delivering competitiveness by increasing efficiency and minimising losses
- Reduce greenhouse gas emissions, working towards a zero carbon emissions target by end of 2050, with interim targets of 15% by 2023 and 80% by 2030 from a baseline of 2013/2014
- Integrate climate change adaptation requirements into our asset management and operations processes to support business resilience and reduce the length and time of service interruptions;
- Consider whole life cycle impacts to reduce our use of resources to sustainable levels, improve the efficiency of our use of energy and water and aim for zero waste;
- Improve land, air and watercourse quality by preventing pollution and contamination and protecting and enhancing biodiversity in our network areas;
- Improve our service to local communities, supporting their economic and social development, protecting vulnerable customers and respecting human rights;

ENV-04-014 gives specific guidance on the management of incidents with environmental consequence, or potential for environmental consequences, over and above the general requirements for the management of incidents.

6. Conclusion

The historical approach to civil assets which are assumed to be maintenance free and replaced with the associated plant at end of life is no longer a valid investment strategy. This is due to the development of mid-life refurbishments and improved maintenance of the main plant equipment. SPT have undertaken a comprehensive programme of condition inspections to identify which assets require refurbishment. This will be the first step in a revised asset management policy to ensure life extension of civil assets.

The proposed option 1 solution delivers a programme to ensure that the life and condition of the transformer bunds and associated oily water drainage systems is in line with their associated transformers.

- Scheme Total Cost: £15.94m
- Timing of investment: 2026 - 2031
- Declared outputs:

Asset	Intervention	Volume	Delivery Year
Civil – Wound Plant – Transformer - 132kV <= 90MVA	Refurbishment	15	2027-2031
Civil – Wound Plant – Transformer - 275kV >= 240MVA	Refurbishment	5	2027-2031
Civil – Wound Plant – Transformer - 275kV < 240MVA	Refurbishment	5	2027-2031
Substation Cable - >=3 core per phase	Replacement	2	2027-2031

- Price control period of outputs: 2027-2031

7. Appendices

N/A