Expenditure Justification – Environment

December 2015

AER Category Expenditure Explanatory Statement

This document describes the expenditure justification for Environment on the United Energy network.

REPEX Road Map

1. Asset replacement – Modelled

a. 6 modelled asset categories

2. Asset replacement – Modelled & Unmodelled

a. Pole top structures + SCADA/protection

3. Other Repex - Unmodelled

a. ZSS primary asset replacement
   (i) Capacitor banks + earth grid + NEs
   (ii) Buildings
b. Non VBRC Safety Projects
   (i) Intelligent Secure Substation Asset Management (ISSAM)
c. Operational Technology
   (i) OT Safety
      - Service Mains Deterioration Field works
      - In Meter Capabilities
        Light Detection and Ranging (LiDAR) Asset Management
      - OT Security
   (ii) OT Reliability
      - Distribution Fault Anticipation Data Collection and Analytics (DFADCAA)
      - Fault Location Identification and Application Development
   (iii) OT Other
      - Dynamic Rating Monitoring Control Communication (DRMCC)
      - Test Harness
      - Develop New and Innovative Technologies
      - DNSP Intelligent Network Device
d. Maintain Reliability Projects
   (i) ACRs and RCGSs
   (ii) Fuse Savers
   (iii) Rogue Feeders
   (iv) Clashing
   (v) Animal Proofing
   (vi) Communications Upgrade
e. Environmental
f. Power Quality
g. Terminal Station Rebuilds

4. VBRC Projects

a. HV ABC
b. REFCLs
c. Other VBRC projects

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1. Purpose

This document provides the expenditure justification for UE's Environmental capital program for the 2016-2020 regulatory control period and should be read in conjunction with supporting document number UE PL 2038 which outlines in detail UE's Environment Strategy and Plan.

Environmental expenditure is required to ensure prudent management of environmental risks to comply with environmental legislation, regulations, policies and standards and to meet the requirements of NER 6.5.7(a)(2) (*capital expenditure objectives*: comply with all applicable *regulatory obligations or requirements* associated with the provision of *standard control services*).

2. Introduction

This document provides the expenditure justification for UE's Environmental capital program for the 2016-2020 regulatory control period. The proposed expenditure is consistent with maintaining compliance and delivering on UE's commitments made to the EPA.

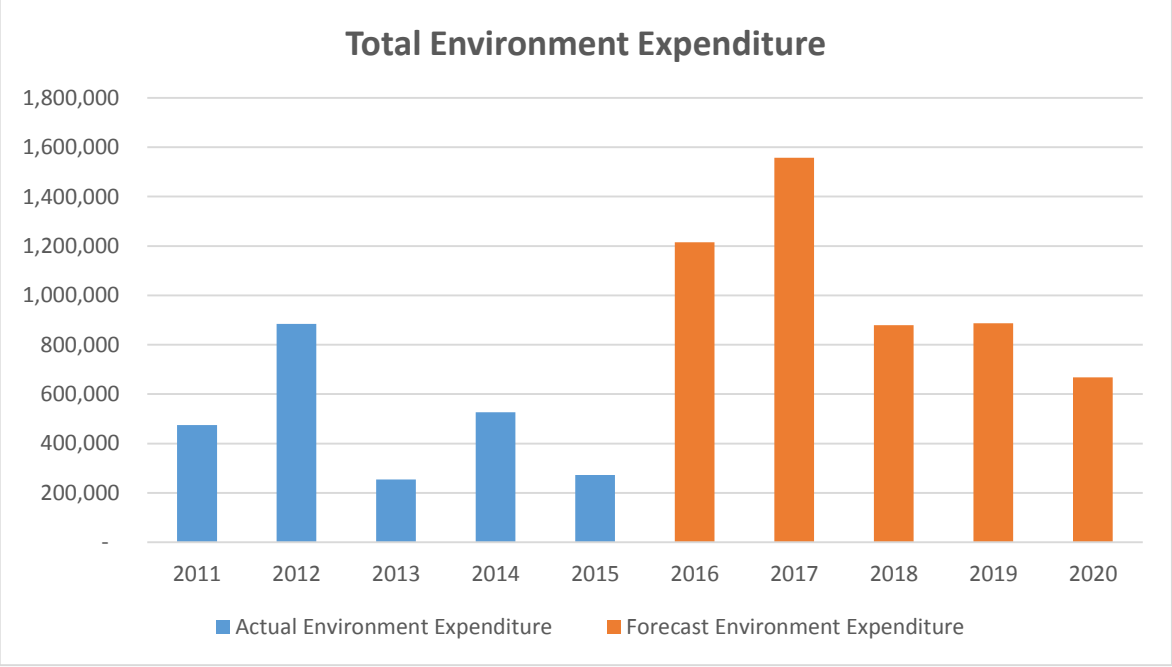
Environmental expenditure covers initiatives for oil containment, noise abatement, asbestos removal, land management and climate resilience. United Energy provides detailed information about these initiatives in strategy and life cycle strategy documents, while further detailed justification for the expenditure is provided in UE PL 2038 "Environment Strategy and Plan".

This document and the principles captured within it are derived from and are consistent with the overall UE Asset Management Policy and Network Performance Strategy.

We have prepared forecasts for each initiative. These forecasts are transformed into expenditure forecasts using either unitised rates or detailed cost estimates for projects. Unitised rates are based on agreed rates from our existing contracts with the service providers Tenix and Zinfra. We develop project cost estimates based on a detailed scope of work. These expenditure forecasts are the base (pre-escalation) forecasts and are reported in the body of this document.

The actual expenditure incurred during the current regulatory period and the expenditure forecast for the forthcoming regulatory period is shown in Figure 1 below. All expenditure is in real 2015 dollars.

Figure 1: Chart of Actual and Forecast Expenditure – Environment ($2015)



The chart shows forecast expenditure to be higher than the current spend predominantly due to the forecast costs associated with, noise abatement at zone substations asbestos removal from UE assets and land management. UE's program addresses the highest risk sites in line with commitments made to the EPA.

Urban growth in UE's distribution zone has also resulted in encroachment of substations from residential developments. UE has experienced growth in the number of noise-related complaints linked to developments adjoining zone substations. To avoid a more costly reactive approach, as a result of a customer complaint, UE has identified a number of high noise sites that are proposed to be addressed in the next regulatory period. These ongoing noise improvement works will ensure UE will comply with EPA requirements.

Figure 2 shows the forecast expenditure for Environment over the next regulatory period. Expenditure is provided in 2015 dollars. A total of $5.2 million is forecast for the 2016-2020 regulatory period compared to $2.4 million for the current period.

Figure 2: Forecast Capital Expenditure – Environment ($2015)

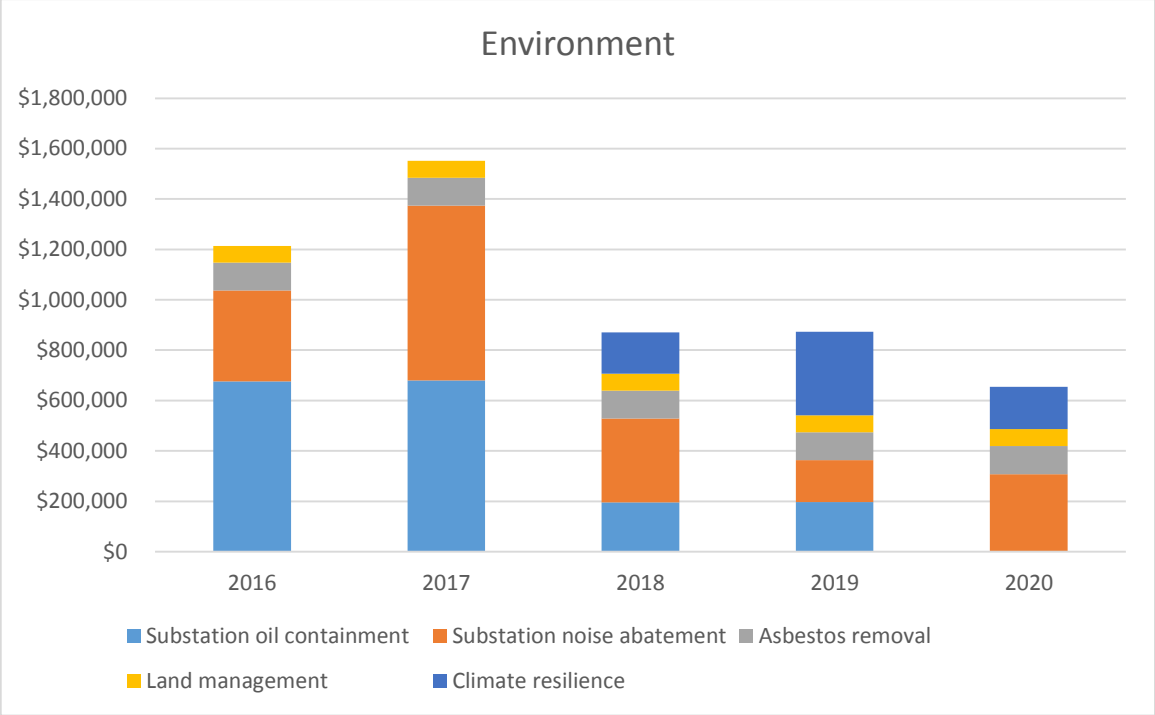


Table 1 shows the expenditure for each program for the current and forecast period.

Table 1: United Energy's historic and forecast environmental capital expenditure 2011-2020

Environmental Program	Description	2011-2015	2016-2020
Substation oil containment	Install oil containment systems on high risk equipment	$2,028,917	$1,747,671
Substation noise abatement	Noise abatement measures to rectify targeted substation transformers that exceed EPA noise limits	$252,248	$1,863,693
Asbestos removal	Remove asbestos from medium risk assets	$97,365	$554,625
Land management	Address potential high risk contaminated sites to determine required management measures	$33,593	$332,775
Climate resilience	Changing design standard to enhance climate resilience	N/A	$665,836
Total		**$ 2,412,122**	**$5,164,601**

UE recognises that the 'headline' data shows a proposed doubling of environmental expenditure from $2.4M in 2011-15 to $5.2M for the 2016-20 regulatory period. However, the apparent increase arises principally because:

- The actual costs of asbestos removal have typically been captured as part of a larger asset augmentation or replacement project. The forecast annual costs are in line with 2015 actual expenditure.
- Land management where the actual costs of this activity have typically been captured as part of a larger asset augmentation or replacement project. Updates to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM) resulted in UE to undertake a program of

land assessments at higher risk sites. The costs associated with the first 3 sites of the program have been captured in 2014/15.

- Climate resilience is to be addressed in the forthcoming regulatory period for the first time.

In relation to substation noise abatement, the forecast expenditure is substantially higher than historic levels because of the increasing challenges of urban encroachment.

3. Background

Environmental expenditure is required to ensure prudent management of environmental risks to comply with environmental legislation, regulations, policies and standards and to meet the requirements of NER 6.5.7(a)(2) (*capital expenditure objectives*: comply with all applicable *regulatory obligations or requirements* associated with the provision of *standard control services*). In this section UE provides material to demonstrate the capital expenditure is necessary to meet its regulatory, legislative and licence obligations.

The electricity industry in Victoria has been the subject of an increased focus on legal compliance from the Environmental Protection Authority (EPA). UE has received EPA notices for noise and oil discharge events in recent years. In addition to EPA notices UE has also dealt with local council and Victorian government representatives over a number of zone substations noise related issues that have been initiated from residents who live in close proximity to these sites. This aligns with legal advice UE received (Landers and Rogers, 2014) that the major environmental issues considered to pose the greatest risk for United Energy (UE) in the coming years are land and asset management; particularly contaminated land, asbestos and waste management.

In order to responsibly manage our risks and legal obligations UE has developed prudent and responsible environmental programs. The Asset Management – Environment Strategy and Plan (document no. UE PL 2038) is a key document that defines the approach for environmental management of our assets for the 2016-2020 regulatory period through a program of environmental related capital and operating expenditure.

This section provides a summary of the need for each of these projects and their relationship to a UE's compliance obligations. The projects align with the following UE environmental objectives:

- Responsibly managing our resources to optimise value while managing environmental risks and reducing impacts on the environment.
- Meeting applicable environmental legislation, statutory obligations and industry standards.
- Openly communicating with government, industry and the community on environmental matters.
- Continuously improving our environmental systems performance.

3.1 Need for the Work

The Environment program is a continuation of work consistent with historic expenditure and new work in accordance with EPA requirements, and focuses on 5 key environmental issues:

- substation oil containment;
- substation noise abatement;
- asbestos removal;
- land management; and
- climate resilience works.

UE's environmental projects are driven by requirements of state legislation concerning environmental protection and to provide a safe workplace for its staff and contractors, customers and stakeholders.

To enable UE to effectively manage environmental risks relating to operational activities, an Environmental Management Plan (EMP) has been developed which identifies business activities that cause the environmental impacts and identifies management and mitigation measures.

UE currently have a broad range of environmental management and mitigation measures in place that are embedded in business as usual processes to manage and prevent environmental risks. These measures drive a program of work.

UE's strategies are also in line with the requirements of its Environmental Management Systems (EMS), which is aligned to the international standard for Environmental Management Systems (ISO 14001).

Refer also to UE PL 2038 Environment Strategy and Plan.

3.1.1. Substation Oil Containment - Bunding

Our substation oil containment program is an ongoing programme of works which is in alignment with our regulatory obligations. It directly responds to the commitment made by UE to the EPA as a result of two oil discharge events into the surrounding environment in 2010, to improve oil containment at priority zone substations. The program targets high risk sites based on proximity to a sensitive receptor (eg a nearby waterway) and the condition of the zone substation transformers. It involves installing oil and water separation technology to prevent oil entering into site drains and migrating off-site into the environment.

UE has determined that this prudent and precautionary approach is consistent with our obligations under the *Environment Protection Act (1993)* as well as the updated bunding guidelines (EPA bunding guidelines 347.1) released by the EPA in 2015, as it seeks to reduce the risk of failing equipment causing significant environmental impact. The expenditure forecast for UE was derived based on five high risk sites being addressed in the 2016-2020 regulatory period.

This program is the continuation of an existing program of works to improve oil containment at priority zone substations. The program aims to address the highest risk sites within the UE network and is in line with commitments made to the EPA as a result of receiving official warning following two discharge events. The program commenced in 2010 by installing Humeceptors at a number of high risk sites each year in addition to upgrading sites as part of substation redevelopment projects.

UE's forecast is based on continuing the program of works by installing fully compliant oil and water separation technology at the five highest priority risk sites over the next 5 years.

UE's proposed work in the forecast period will ensure zone substation bunding meets current EPA requirements. The work is required to meet EPA requirements to prevent contamination caused by oil spills from transformers and for the most part consists of creating bunds or sealing existing bunds. At each substation it will include the installation of a Humeceptor to prevent oil spills from entering the environment via storm water.

3.1.2. Substation Noise Abatement

The State Environment Protection Policy (SEPP N-1) (Control of Noise from Commerce, Industry and Trade) sets out noise level requirements for business. To ensure all new assets comply with these regulations UE has included noise as one of the key criteria that inform new substation design. However for existing substations, UE's strategy to manage noise mitigation is through the implementation of a Noise Environmental Improvement Plan (EIP) that addresses noise emission at substations that exceed the noise levels set out in the EPA guidelines. The implementation of the noise EIP is an ongoing program which has achieved positive environmental results to date (reduction of noise emissions at 14 zone substations which previously exceeded EPA Guidelines).

In accordance with our regulatory obligations UE will continue implementation of the noise EIP to address remaining zone substations that currently do not meet the regulatory requirements.

The State Environment Protection Policy (SEPP N-1) (Control of Noise from Commerce, Industry and Trade) sets out noise level requirements for business. If a customer noise complaint is received relating to an asset, UE is required to investigate and implement reduction measures to meet the specified noise limits. UE has included noise as one of the determining criteria when selecting sites for new substations, purchasing new transformers, and designing new substations to comply with EPA noise emission requirements and minimise any noise impact to the community.

UE's strategy to manage noise mitigation is through the implementation of an Environmental Improvement Plan (EIP) that opportunistically, addresses the risk through:

- Annual programs to improve (reduce) the noise levels at non-compliant zone substations;
- Opportunistic programs when major augmentation works are being undertaken; or
- When a notification is issued by the EPA.

In addition to UE's ongoing management of noise from substations, growth and development of residential Melbourne has resulted in encroachment of substations from residential developments adjacent to substations. UE has recently experienced noise-related complaints linked to developments adjoining zone substations that UE has little choice but to action. UE is proposing noise reduction works at nine zone

substations in the forecast period and for ongoing monitoring for UE assets to assess compliance with the EPA SEPP N-1 guidelines.

The works may vary from substation to substation but generally UE has forecast that to address noise issues at most of the nominated sites will require the installation of acoustic barriers (partial or full enclosure). In the majority of sites tonal noise emanating from transformers is the issue and the most prudent way to address this issue is to install acoustic barriers. Previous noise abatement projects predominately involved the the replacement of noisy components such as transformer cooling fans. The installation of acoustic barriers is a more expensive solution and hence the increased expenditure forecast for this program.

UE has analysed alternatives to meet our obligations, and has submitted least cost options as part of its revised proposal.

3.1.3. Asbestos Removal

UE owns a significant number of assets, which due to their age have the potential to contain asbestos. These assets include service pillars and pits, non-pole distribution substations, zone substations and depots. In the event that UE business or construction activities are incorrectly managed, asbestos containing material may become disturbed or damaged, posing risks to the environment and the community.

In line with the *Environment Protection Act (1993)* and *the Occupational Health and Safety Act (2004)* UE has undertaken reasonable and practicable steps to identify the presence of asbestos containing materials under our management control. Known asbestos-containing materials are recorded on the UE Asbestos Register and managed in accordance with the UE Asbestos Management Plan (U PR HSE 0024).

The majority of such materials assessed to date are categorised as 'low health risk' with a relatively small number assessed as 'medium health risk. UE has forecast for the next regulatory period a modest amount of $110K per annum, to address the removal of asbestos from some of the medium risk assets and/or those assets that become friable as a consequence of age or disturbance.

A range of activities associated with the operation of UE assets can lead to the disturbance of asbestos containing material, including:

- handling, storage and transport of asbestos containing material;
- damage and failure of network assets and equipment;
- excavation, trenching and underground boring;
- removal or other movement of soil containing asbestos; and
- construction, maintenance upgrade or decommissioning activities.

3.1.4. Land Management

The construction, operation, maintenance and decommissioning of electricity distribution networks often involves land disturbance. UE has significant land holdings. Some of this land has, or may have been, contaminated by activities from previous land use, or as a result of UE operations (current or present).

The *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM)* was updated in 2013 and provides a framework for investigating and determining the risks associated with contamination on a site. In line with the updated NEPM, UE have developed a program to undertake detailed site investigations at potential high risk sites to determine the required environmental management measures and remediation assessments to meet the NEPM requirements. The land management program is a continuation of detailed site assessment works undertaken at 3 selected higher risk sites in 2014/15 in response to the amended regulatory guidelines for contaminated sites. One of these sites was the Railway Parade site in Dandenong where a detailed investigation was undertaken. This site was previously an SECV depot and is currently vacant land. Site investigations determined that there is soil and groundwater contamination, including the presence of asbestos in the soil. A comprehensive EMP will be developed for this site to address issues including engaging the EPA to determine the source of the ground water contamination

The land management program is scheduled to perform detailed site investigations at 10 zone substation and 4 high distribution sites per annum.

3.1.5. Climate Resilience

UE is required under the NER to reliably distribute electricity to its customers. In the coming decades this is going to provide a significant challenge as UE's network is expected to be exposed to more extreme events (heatwaves, storms, wind, flooding) as the climate changes. UE has already experienced the effects of extreme heatwaves in January 2009 and 2013 which resulted in blackout across part of the network. It is therefore imperative that UE ensure the network is resilient to weather related events now and into the future. UE has therefore committed to understanding its risks from the weather and future climate, and the potential impacts on the network, customers, operations and staff.

In line with the Environment Management Strategy and Plan (UE PL 2038) an allowance has been included in the forecast to improve the resilience of the network. UE's approach is to continue investigations and assessments in the first few years of the next regulatory period before considering the appropriate capital investment strategy to manage risks posed on the network by a changing climate.

UE considers that forecasting this expenditure is a prudent approach reflective of our obligation to meet the NER reliability objectives over the next regulatory period.

The capex forecast is based on an example adaptation response building resilience in the network to cope with extreme heat. UE's assets are designed to operate at 40 degree ambient temperature. In instances where extreme temperatures are combined with high demand there will be more instances of asset failures and hence network outages, as assets are operated beyond their design parameters. A possible adaptation strategy by UE to mitigate this risk may include installing better system monitoring devices, increase the number of local transformers and change the standard and equipment ratings to a higher ambient operating temperature.

3.2 Review of Historical Expenditure

UE's actual environmental expenditure for the current Regulatory Control Period (RCP) is expected to be $2.4M (see details below). This contrasts markedly with the AER's final decision for the 2011-15 period, which provided no allowance for environmental expenditure.

Table 2 reiterates the earlier observation that expenditure for asbestos removal and land management was incorporated in replacement or augmentation project costs. This explains why no costs are recorded for 2011-14 in relation to asbestos.

Table 2: UE Actual Expenditure – Environmental 2011-2015

Project	Capital Cost ($k)					
	2011	2012	2013	2014	2015	Total
Substation Oil Containment	$460,121	$731,512	$239,620	$456,428	$141,235	$2,028,917
Substation Noise Abatement	$14,109	$153,219	$14,267	$70,652		$252,248
Asbestos Removal					$97,365	$97,365
Land Management					$33,593	$33,593
TOTAL	$474,231	$884,731	$253,887	$527,080	$272,193	**$ 2,412,122**

Table 3: UE Forecast Expenditure – Environmental 2016-2020

Project	Capital Cost ($k)					
	2016	2017	2018	2019	2020	Total
Substation Oil Containment	$676,307	$679,661	$195,407	$196,296		$1,747,671
Substation Noise Abatement	$361,028	$694,339	$333,469	$166,949	$307,908	$1,863,693
Asbestos Removal	$110,441	$110,646	$110,622	$110,944	$111,972	$554,625
Land Management	$66,265	$66,387	$66,373	$66,567	$67,183	$332,775
Climate resilience			$165,132	$332,833	$167,871	$665,836
TOTAL	$1,214,041	$1,551,033	$871,003	$873,589	$654,934	$5,164,600

Table 3 shows our forecast environmental expenditure. Asbestos removal and land management costs are broadly in-line with actual expenditure in 2015. Land management is expected to increase predominately due to the number of sites where land assessment will be undertaken (14 sites per annum compared to 3 completed in 2014/15) which translates to a modest annual cost of an addition $34k..

The most significant increase is substation noise abatements and climate resilience work. As explained in this document these increases reflect external changes – being increasing urbanisation encroaching on substations and the impact of climate change – which are beyond UE's control. In each case, our approach is to minimise costs to customers by taking a proactive approach to these issues.

4. Forecast Volume of Work

UE is proposing five programs to maintain environmental compliance:

- A program to install oil containment at identified zone substations;
- A program to install noise abatement at identified zone substations;
- A program to manage asbestos removals;
- A program to address land management issues; and
- A program to study network climate resilience.

A summary of the value of the work programs for UE Power Quality Maintained is reproduced in the table below.

Table 4: Forecast Capex Environmental

Environmental Program	2016	2017	2018	2019	2020	Total
Substation oil containment	$676,307	$679,661	$195,407	$196,296		$1,747,671
Substation noise abatement	$361,028	$694,339	$333,469	$166,949	$307,908	$1,863,693
Asbestos removal	$110,441	$110,646	$110,622	$110,944	$111,972	$554,625
Land management	$66,265	$66,387	$66,373	$66,567	$67,183	$332,775
Climate resilience			$165,132	$332,833	$167,871	$665,836
Total	**$1,214,041**	**$1,551,033**	**$871,003**	**$873,589**	**$654,934**	**$5,164,600**

5. Justification

This section provides a summary of the justifications for each of the categories of the asset group.

The overall spend in this area is modest but crucial to ensuring UE meets its compliance obligations and appropriately manages risks associated with noise, asbestos and oil containment.

5.1 Oil Containment

This project is an upgrade of an ongoing program of works to improve oil containment at priority zone substations. The program addresses the highest risk sites within the UE network and is in line with commitments made to the EPA as a result of receiving an official warning following two discharge events. The program commenced in 2010 by installing Humeceptors at a number of high risk sites each year in addition to upgrading sites as part of substation redevelopment projects.

In the SECV era, power transformers had basic oil containment (known as a bund) installed, involving a small brick wall around the power transformer foundation, with a base of crushed rock. The design (110% of transformer oil volume) was intended to prevent oil spreading into site drains and off-site and did not consider a residual legacy of oil going into the soil and disbursement of contamination.

The UE Bund Design, Maintenance, Operation and Response Procedure 1241, outlines the business' current standard for oil containment at substations which has substantially improved since the days of the SECV. These new standards require all new substations to have a solid concrete base, sealed concrete walls, an oil containment pit and associated valves and pipes to fully contain any oil in the event of a leak, spill or fire in line with EPA Bund Guideline 347. However, there are still a large number of substations across the UE network that were built to the old design standards and are still operational.

In 2010, off-site discharges of oil into the surrounding environment at Hastings (HGS) and Glen Waverley (GW) zone substations triggered an Environmental Protection Agency (EPA) investigation, resulting in an EPA warning.

All UE zone substations were audited to identify the high risk sites and these findings, which included recommendations to repair high risk transformer oil leaks and improving of the transformer bunds, were presented to UE Management in August 2010. A formal commitment was made to the EPA in July 2010 that the program of work, the zone substation transformer oil containment project, would be performed in a programmatic manner, with substations prioritised for action based on a number of factors including severity of leaks, proximity to nearby waterways and age of the asset. Since 2010, UE has been implementing the committed program by installing Humeceptors at a number of high risk sites each year in addition to upgrading sites as part of substation redevelopment projects.

Five alternative options are considered and their respective regulatory, environmental and financial implications are evaluated. The proposed strategy achieves the need to improve the impact of the network on the environment and meets fully the commitments made to the EPA in 2010.

As the bund arrangements at many zone substations are still not compliant with Bund Design, Maintenance, Operation and Response Procedure 1241, there is an increased risk to UE of receiving penalties from the EPA.

5.1.1. Options Analysis – Oil containment

Option 1 - Status Quo ('Do Nothing')

This option does not contribute to the continued improvement of the UE assets and has the following disadvantages:

- Breaks commitments made to EPA in 2010 to avoid penalties relating to site releases from HGS and GW Zone Substations.

- Will most likely result in costly legal notices and enforceable undertakings.

Option 2 – Improve Bunding and install Humeceptors at 5 highest risk sites

This option is an upgrade of the existing transformer bunds at relevant sites. The works required at each site will vary but include items such as sealing existing bunds with a waterproof membrane and concrete, repairing brickwork and drainage systems, installation of oil-water separation pits, and associated valves. This option incorporates the installation of Humeceptors.

In summary, this option:

- Addresses high-risk substations.
- Brings oil bunding as near as practically possible to current standards.
- High capital outlay.

Option 3 – Refurbish Transformers to address oil leaks

This option would involve a mix of capital and operational costs (as the work is not always extending the life of the transformers, but is simply repair work). This would involve a total cost comparable to the oil containment work, but not address the underlying poor oil containment bunds in these substations. The repair/refurbishment work to be undertaken on the power transformers is a temporary measure to address leaks, particularly on ageing equipment, and it can be expected that within 5 years the transformers will develop leaks again

This option has been considered however the following disadvantages have been identified:

- Unnecessary capital works (where the transformer is not near the end of its' life).
- Similar cost option up front to option 2, but will require further capital investment later (fixing oil leaks is a temporary measure).
- Does not improve the bunding arrangement at zone substations.

Option 4 – Install a Humeceptor to contain oil from stormwater drains

This option is potentially the least cost capital option (excluding option 1 – Status Quo), however, it will be dependent on soil condition, associated civil works and site layout. In addition this option does not fully meet the UE commitments made to the EPA. It does address the significant risk of oil leaving the substation through the drainage system into a nearby waterway. It is recognised that this option will not prevent oil entering the soil profile and impacted groundwater in the event of a leak.

This option has a number of advantages and disadvantages.

- Lower capital cost.
- Demonstrates to the EPA that the business is investing in reducing environmental impact.
- Does not address the risk of oil leaks on the site.
- It only partially complies with the commitments made to EPA in 2010 to avoid penalties relating to site releases from HGS and GW Zone Substations.
- It does not mitigate the risk of oil contaminating the ground within the ZSS.

Option 5 – Install oil and water separation technology

Oil and water separation is a new technology for UE, but it has been used successfully by other utilities. Existing bunds on UE sites can be retrofitted with impervious membranes. These membranes allow water to flow through them unimpeded, but when oil comes into contact with the membrane, it solidifies, trapping the oil within the membrane. The membrane is large enough to cope with the steady small scale leaks associated with transformers, which would lead to small scale solidification, while continuing to let water pass through. Therefore maintenance costs are minimal (an annual routine inspection programme would suffice).

This option has the following advantages and disadvantages:

- Solution is consistent with agreements made with EPA.
- Minimal civil works required. Solution takes advantage of existing infrastructure and retro-fitting techniques.
- Minimal to negligible maintenance costs.
- Innovative solution that is consistent with the intent of EPA Bunding Guidelines.
- Higher capital costs.

5.1.2. Recommendation – Oil containment

Option 5 at a capital cost of $1.75M is recommended as it allows UE to meet EPA requirements, which reduces the risk of equipment failure causing significant environmental impact.

The evaluation summary analysis is detailed in the table below and is based on performing works at the five highest priority sites over a 5 year period.

Table 5: Oil Containment Option Analysis

Options	CAPEX ($'K)	OPEX ($'K)	Overall Risk Rating	Benefits	Overall Rating
Option 1 -Status Quo	0		High	N/A	Unsuitable, does not address EPA requirements
Option 2 **Improve Bunding and install interceptors**	1,975	15	Low	Transformer bund meets UE current standards	3 – Not recommended (High cost)
Option 3 **Refurbish Transformers**	2,370	400	Medium	Addresses transformer leaks but does not address risk associated with an oil spill	4 – Not recommended does not meet EPA requirements and high cost
Option 4 **Install interceptors**	950	15	Medium	Addresses risk of oil leaving substation through drainage system	2 Not recommended only partially meets EPA requirements, also potentially very high civil costs
Option 5 **Install Water/Oil separation technology**	1,750	25	Low	Minimal civil works uses existing infrastructure and will contain any oil spill within enclosure.	1 – Recommended fully complies with EPA requirements

5.2 Noise Abatement

The purpose of this project is to enable UE to manage the noise emissions from its substations in accordance with the current policy of noise management as per the Environmental plan UE PL 2038.

This project aligns with the following Asset Management and Environmental objectives:

- Responsibly managing our resources to optimise value while managing environmental risks and reducing impacts on the environment.
- Meeting applicable environmental legislation, statutory obligations and industry standards.
- Openly communicating with government, industry and the community on environmental matters.
- Continuously improving our environmental systems performance.
- Progressive compliance with SEPP N-1 for aged zone substation sites.
- Improves the relationship with customers and the public who are impacted by noise emissions from large substations.
- Demonstrates ongoing improvement to sites identified as non-compliant, progressively working toward EPA SEPP N-1 compliance.

5.2.1. Options Analysis – Noise Abatement

Option 1 – Do nothing

The “do nothing” option is an unsuitable option as it does not address our ongoing requirement to be compliant with EPA SEPP N-1 for locations owned by United Energy.

Taking no action may result in the EPA taking action under the EPA Compliance and Enforcement Policy (publication 1388) if United Energy is no longer able to demonstrate that it is implementing an environmental management and improvement plan. There can be significant costs associated with this option.

It is not recommended that United Energy change its current policy and stop addressing any environmental impacts.

Option 2 - Refurbish Aged Assets

In the past, attempts have been made to perform refurbishments on aged equipment to reduce their noise levels. Unfortunately these minor-to-medium refurbishments and more frequent maintenance often have a short-term impact, and within a few years the noise level has returned, or in some cases is greater as the assets (typically power transformers and capacitor banks) have aged. Option 2 is not recommended as a feasible option

Option 3 - Replace Aged Plant

Modern equipment in zone substations is purchased and tested with sound level limits, and is constructed with noise management infrastructure including sound walls, enclosures and low-noise cooling fans. However, these are not always practically possible to retrofit to aged transformers and capacitor banks, depending on the performance impact of these options.

In some cases it is not practical to undertake noise mitigation works. There is no other practical course of action except to replace the plant in question. This option is not the least-cost option unless there are other project benefits and drivers that when combined, result in the replacement of the asset being the least-cost option to UE. Option 3 is not the least-cost option unless there are other drivers to the asset replacement such as an end-of-life condition assessment.

Option 4 - Perform Noise Mitigation works

As zone substation equipment ages, the fittings and clamps loosen from the vibration that occurs during the supply of electricity, and the plant will become noisier than when it was new. Over time, this noise will increase until the substation exceeds regulatory limits.

In this case, the noisy plant is identified, and noise mitigation measures such as a sound enclosure, noise barrier, change in control scheme or swapping out a noisy sub-component (such as cooling fans) with a low-noise equivalent. The cost of this option is typically 5-10% of the cost of replacement of the aged plant.

5.2.2. Recommendation – Noise Abatement

It is recommended that the least cost option (see table below) is to perform noise mitigation works to ensure compliance progressively, to maintain the current program of noise abatement across each of the substations identified as being non-compliant with SEPP N-1. Where other large capital works are taking place at the same time, then replacement of the aged assets shall be chosen as the least cost instead in accordance with UE PL 2038.

Table 6: Noise abatement Option Analysis

Alternative	Option 1 Do Nothing	Option 2 Refurbish plant	Option 3 Replace aged, noisy plant	Option 4 Perform noise mitigation works
Technically Viable	Yes	No	Yes	Yes
Address Reliability	N/A	N/A	N/A	N/A
Network Flexibility	N/A	N/A	N/A	N/A
Outcome	Does not comply with existing policy and EPA legislated requirements around noise	Experience has shown this option to be ineffective	Not the least cost option. Only to be implemented as an opportunistic policy	Least cost option to comply with EPA requirements and current policy

5.3 Asbestos

In line with the *Environment Protection Act (1993)* and *the Occupational Health and Safety Act (2004)* UE has undertaken reasonable practicable steps to identify the presence of asbestos containing materials under our management control. UE has a significant number of asbestos containing assets installed within its network. These assets include service pillars and pits, non-pole distribution substations, zone substations and depots. Known asbestos-containing materials are recorded on the UE Asbestos Register and managed in accordance with the UE Asbestos Management Plan (U PR HSE 0024).

The majority of asbestos containing materials on the UE network can be categorised as ‘low health risk’ with a relatively small number assessed as ‘medium health risk’.

UE has allowed for a modest amount of **$110K** per annum in the next regulatory period, to address the removal of asbestos from some of our medium risk assets to meet our regulatory obligations.

5.4 Land Management

In line with the updated NEPM, UE will continue to undertake detailed site investigations at potential high risk sites to determine the required environmental management measures and remediation assessments to meet the NEPM requirements. The land management program is a continuation of detailed site assessment works undertaken at selected zone substations in 2014 in response to the amended regulatory guidelines for contaminated sites.

Preliminary, and if required, detailed site assessments for selected potential high risk properties will be undertaken to inform appropriate management measures and remediation liability assessments. This will

include the continuing development of an interactive GIS overlay of contaminated land throughout the UE network area. These overlays will enable UE staff and service providers to easily identify areas of known contamination and plan for this in any maintenance or construction works in the area. The ongoing update of these GIS overlays will provide significant efficiencies for the business going forward as the need for soil and ground water testing ahead of all intrusive maintenance or construction activity can be minimised.

Through the initial stages of the Contaminated Land Management Plan project several sites within the UE network were identified as potentially having a severe risk of contamination. To determine the extent of contamination and the associated risks, UE plan to undertake more detailed site investigations to determine the required management measures in line with regulatory requirements. The first site that will undergo detailed investigation is the Railway Parade site in Dandenong. This site was previously an SECV depot and is currently vacant land. Based on preliminary site investigations there is soil and groundwater contamination, including the presence of asbestos in soils. Planned detailed site investigations and the undertaking of required remediation in the 2016-2020 regulatory period, aligns with our obligations under the *Environment Protection Act (1993)*.

5.5 Climate Resilience

All types of infrastructure, including electricity networks, face weather-related risks which operators need to manage. Extreme events sometimes lead to serious problems, and twice in recent years extreme heatwaves have resulted in blackouts across parts of UE's network. In the coming decades the nature of such risks is going to change as the climate changes. UE wants to be prepared for this, and ensure that the assets it invests in continue to perform well in the long term.

UE's Tier 1 Climate Risk Assessment Report sets out actions that are available to UE to manage its risks by enhancing resilience and reliability. The main recommendations of the report is for UE to develop and adopt a climate strategy, early steps include:

- To review the risks identified in the Tier 1 Climate Risk Assessment Report, including their ratings and priorities
- Incorporates climate risk into decision-making criteria for capital expenditure for asset infrastructure.
- Improves data capture and accuracy for asset performance such as outages and maintenance as linked to weather and climate conditions.
- Completes a quantitative risk assessment, following tier 2 of ENA manual.
- Carries out a comprehensive analysis of outage and operations data, cross-referenced with data from local weather stations.
- Commissions further climate modelling to fill identified gaps, including flooding.

6. Summary and Conclusion

In this document, UE has explained how it has prepared the forecast for our projects to meet our environmental obligations.

UE believe that this document and its supporting references provide a compelling justification and that the AER should accept our forecast environmental expenditure.

The AER can be confident that this forecast is in accordance with the Rules for capital expenditure and objectives because it maintains our compliance at least cost.

- UE manages its environmental responsibilities in a prudent and efficient in manner that reflects best practice. UE has forecast expenditure
  - On noise reduction projects at nine key substations to meet our obligations under legislation;
  - Bunding works at five key zone substation to meet our obligations under legislation;
  - A modest budget to replace asbestos as it is identified;
  - A modest budget for land management; and
  - For ongoing climate assessments
- The forecast for these projects use the most appropriate forecasting methodology.
  - Each project has been separately costed using a bottom up approach where projects for individual sites are scoped and costed. Where similar projects have been carried out previously they have been used as a reference for the projects discussed here.
  - All projects are subject to justification and a business case process.