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Mr Christian Dunk, for the attention of the Minister for Environment, the Hon. James Griffin MP – christian.dunk@minister.nsw.gov.au

21 March 2022

Dear Ms Moore

Re: Submission to EPA's proposed Recovered Fines and Recovered Soils Orders and Exemptions

The Waste Management and Resource Recovery Association of Australia (WMRR) and the Waste Contractors & Recyclers Association of NSW (WCRA) appreciate the opportunity to provide a joint response, on behalf of the Construction and Demolition (C&D) waste management and resource recovery sector, to the NSW EPA's request for submissions on its draft proposed Recovered Fines and Recovered Soils Orders and Exemptions.

WMRR and WCRA thank the EPA for its considerable efforts to-date, and we look forward to working with EPA staff and the NSW government to ensure we achieve the best possible, sustainable resource recovery outcomes for the C&D waste sector. It is hoped that the outcomes of this review will not create perverse and unintended consequences, including significant increases in, and unnecessary volumes of materials disposed to landfill, long distance transport of C&D waste to other jurisdictions, and increased costs that will make legitimate C&D recycling in NSW unviable, which will result in long standing reputable operators having to walk away from the C&D recycling sector.

Our concerns about the EPA's powers to amend and revoke Resource Recovery Orders and Exemptions without the appropriate regulatory impact, scientific, and economic studies are well documented. In making any decisions on C&D recycling, WMRR and WCRA urge the EPA to consider the following:

- To achieve the diversion targets in the NSW waste strategy, we will require infrastructure and investment from the commercial sector.
- The commercial industry requires certainty as well as adequate time and a rate of return, which form a key part of the investment decision process. These are significant as investment decisions require the approval of financiers, banks, the Board, etc.

At present, infrastructure is significantly lacking in NSW – an issue that was both exacerbated and brought to the fore during the recent unprecedented rain events in February/March 2022. It was evident to all stakeholders, including the government and regulators, that NSW has limited disposal options for Sydney's waste, and we are lacking an infrastructure network to safely address our essential waste management disposal needs. In light of these ongoing challenges, it is critical that EPA and the NSW government support the C&D recycling sector – and the waste and resource recovery sector broadly

- by ensuring that the regulatory framework does not hinder legitimate resource recovery business operations.

On behalf of our members, WMRR and WCRA submit the following:

- **WMRR and WCRA's joint 25-page submission** on the EPA's Draft Recovered Fines Orders and Exemptions March 2022 and Draft Recovered Soils Orders and Exemptions March 2022.
- **Appendix A: a report from Environmental Risk Sciences Pty Ltd** to WCRA and WMRR providing advice regarding technical aspects of the draft resource recovery orders and exemptions for recovered fines and recovered soils recently issued for comment by the NSW EPA.
- **Appendix B: Industry, Recycling and Economic Impacts** from changes to recovered fines and soils orders and exemptions.
- **Appendix C: Transition timeline**
- **Appendix D: Proposed revised waste classification/resource recovery response strategy**

WMRR and WCRA are seeking a joint half-day meeting with senior EPA staff to meaningfully discuss and present our submission and appendices, including any relevant material contained in our submission from October 2021.

The stakes are high, with numerous jobs and livelihoods on the line, and we look forward to working with EPA staff to protect and grow our industry.

Please do not hesitate to contact either of the undersigned if you would like to further discuss this joint WMRR and WCRA submission.

Yours sincerely

Gayle Sloan
CEO
WMRR

Tony Khoury
Executive Director
WCRA

WMRR & WCRA Joint Submission on the EPA's Draft Recovered Fines Orders and Exemptions March 2022 and Draft Recovered Soils Orders and Exemptions March 2022

Contents

Introduction

The following is a joint response from the Waste Management & Resource Recovery Association of Australia (WMRR) and the Waste Contractors & Recyclers Association of NSW (WCRA) on behalf of the Construction and Demolition (C&D) waste management sector, to the New South Wales (NSW) Environment Protection Authority's (EPA) request for submissions on its draft proposed Recovered Fines and Recovered Soils Orders and Exemptions.

In October 2021 WMRR and WCRA submitted a joint response to the NSW EPA on its proposed revocation of both the Continuous and Batch Recovered Fines Orders and Exemptions, and its new proposed Recovered Soils Order and Exemption. That submission provided details about the C&D waste management sector, its importance in achieving recycling targets and to the NSW economy, and the impacts that the proposed changes would have on both the recycling and construction industries. The submission also included a number of specialist reports that our members commissioned dealing with asbestos risks and economic impacts.

With its various attachments, the submission totalled over 400 pages and provided alternative solutions with a transition pathway to reach them. Unfortunately, the NSW EPA's response to this and the 49 other submissions it received is a two-page summary of themes on its website. Given the efforts expended and costs incurred by the industry to explain the impacts and risks, and provide alternative approaches, in the short period of time provided for the consultation, that limited response was extremely disappointing. Accordingly, we request that WMRR and WCRA CEOs, Gayle Sloan and Tony Khoury, are provided with the opportunity to present the findings in this submission to the EPA at a face-to-face meeting at an agreed time in the week commencing 21 March 2022.

In response to the EPA's proposed changes to the resource recovery of C&D waste, the associations' members have financed various reports to support both the October 2021 submission and this response and to understand the impacts of the proposed EPA changes. Expenditure for expert consultants and direct association costs totals in excess of $173,000 to date. Our members are of the view that had the EPA undertaken a more rigorous analysis and an appropriate level of due diligence in developing its proposed changes, this significant expenditure could have been avoided.

No revocation but no change to impacts

On 7 February 2022 at 9.14pm the EPA notified licensed C&D waste management operators of its intention to introduce new orders and exemptions for Recovered Fines and Recovered Soils, and subsequently held two open information sessions. Initially the consultation period for comments on the draft orders and exemptions was 21 February 2022, which was subsequently extended to 4 March 2022. This was a very short time frame to organise and submit a considered response from the industry, let alone prepare for such significant changes operationally. Further correspondence from the EPA then indicated that the current recovered fines orders and exemptions would be replaced by a new batch recovered fines order and exemption commencing April 2022. Subsequent discussions have indicated that the EPA is willing to extend this period, and engage directly with the industry to understand impacts and transitional requirements necessary to introduce such significant changes. This is welcomed by the industry. Further, the EPA has indicated that the recovered fines and soils draft orders and exemptions will not be implemented before 30 June 2022. Whilst this delay is appreciated by the industry, it is still insufficient for a fully functional transition to the new requirements. Our considered view is that to fully implement the current proposed requirements would take twelve (12) months, however industry proposes a staged implementation of these changes over nine (9) months depending on the final agreed position and in particular the changes laboratories

would need to make to meet the final requirements. See the Recommendations and Transition Sections and Appendix C.

Previous submission still relevant

Although the current proposal from the EPA is to significantly amend the recovered fines orders and exemptions rather than revoke them completely as previously indicated, much of the information, impacts, costs, and consequences identified in our October 2021 submission continue to be relevant. Accordingly, attached as Appendix B is revised information that was provided in our October 2021 submission relating to impacts on the construction and resource recovery industries, recycling targets, and the state's economy. This remains relevant given the change of Minister for the Environment and EPA CEO since October 2021, and in the hope that a more fulsome and considered response is provided by the EPA.

Key concerns with proposed drafts

The proposed changes affect the entire supply chain for the resource recovery and beneficial use of recycled C&D waste (i.e., waste generation, collection, transportation, processing, product on-sellers to end users). Some of the proposed requirements are unworkable, and even with amendments the industry and everyone involved in the supply chain will need a reasonable time to transition to a new regime. The industry has particular concerns about asbestos, operational requirements and transitional considerations which are summarised below:

Asbestos

- The strict liability approach for asbestos finds, and the exposure for processors in terms of responsibility for asbestos found at the end of the supply chain that is outside of their control.
- Lack of technical understanding and rigour within the requirements, with the creation of bespoke testing by NSW EPA, which it is not scientifically possible to meet.
- Applying a regime that does not account for actual risk renders the resource recovery of fines and soils commercially unviable.
- Requirement to report to EPA even if concentration is below detection limit.

Operational Requirements

- Preamble wording is overly emotive and undermines the appropriate use of the products.
- Apparent restricted use of the products, especially in respect to landscaping and as topsoil underlay which are the main market for these products.
- Sampling density, stockpile management and testing, especially for smaller sites but even some larger sites will struggle without increasing site size and holding time whilst testing and reporting takes place.
- Availability of required certified third parties, e.g., Certified Environmental Practitioners and NATA accredited laboratories, at time of implementation.
- Scope and the responsibilities of Certified Environmental Practitioners are impractical operationally if role is required to perform the full suite of requirements.
- Providing records to every customer is impractical and unwarranted. It would be more efficient to make these available on request or on company websites.
- New expanded suite of chemicals and attributes to test for absent of any justification of the risks, e.g., Acid Sulphate Soils and PFAS and their appropriateness relative to the risks they pose from C&D waste.
- The practicality and appropriateness of the required analytical methods, limits of reporting and sample management at laboratories.

- Increased costs associated with all of the above are likely to mean C&D recovery and recycling cannot compete with disposal to landfill.

Transitional Considerations

- Proposed timeframe for the commencement of new requirements.
- Communication with all stakeholders in the supply chain.
- Current stockpiles and throughput on processing sites.
- Changes to staffing (levels & skills), systems, equipment and pricing.
- Product sold but not yet applied to land.
- Availability and accreditation of laboratories accredited for required chemical analysis. Assuming this is possible given NSW EPA proposed bespoke testing that is beyond NATA accreditation and Australian Standards (see EnRiskS report at Appendix A).

Submission Structure

This submission is structured as follows:

- WMRR & WCRA members
- Concerns, issues and implications –
    - Part A: Asbestos
    - Part B: Operational Impacts
- Clarifications and ambiguity
- Recommendations
- Transition Requirements
- Conclusion

Who We Represent

The Associations and their members

WMRR and WCRA represent the industry operators most impacted by the proposed orders and exemptions for recovered fines and soils.

WMRR is the national peak body for the $15bn waste and resource recovery industry. WMRR membership covers the C&D waste sector along with the entire range of waste and resource recovery industries including landfill, recycling and resource recovery, energy from waste and the e-waste, organics, commercial and industrial, hazardous and biohazardous waste sectors. WMRR has over 2040 members nationally (718 in NSW), representing almost 500 companies.

WCRA has been representing the NSW waste management sector since May 1948. WCRA is a registered industrial organisation under both the *NSW Industrial Relations Act* 1996 and the *Fair Work (Registered Organisations) Act* 2009. WCRA currently has 212 members who own, operate and/or control the vast majority of assets used in waste management collection, processing and disposal across NSW and the ACT.

Across both associations, more than 100 organisations will be directly impacted by the proposed orders and exemptions. This includes both large recycling businesses and small to medium enterprises (SMEs). There are also many smaller businesses that provide skip bin services to residential and commercial building sites across the state. These small-scale operators will be significantly impacted by the proposed changes. The impacted businesses process approximately 2.85 million tonnes per annum (tpa) of C&D waste and 1.24 million tpa of recovered fines and soils from a range of C&D sources, of varying size, scale and complexity from simple residential renovations through to large civil

and commercial infrastructure projects. As a result, the industry is worth around $500 million to the NSW State economy, employing 580 FTEs for mixed waste recycling and 450 FTEs for source separated recycling. As many as 380 of these jobs are in western Sydney particularly in areas where high unemployment rates are common.

The construction sector in NSW is the fourth largest contributor to NSW GSP at $15 billion. The C&D waste management industry is a vital and important component of the building and construction supply chain. It continues to perform a particularly critical function during a period of growth within NSW, where there has been significant recent development both in infrastructure and in State policy to drive sustainable development and resource recovery. The industry will play a key role in achieving the desired targets and outcomes from the State government's *Waste and Sustainable Materials Strategy (WaSMS) 2041*, the accompanying infrastructure needs analysis and the EPA's *Waste Delivery Plan.* Without a fully functioning and viable C&D recycling sector the State government's plans are in jeopardy.

It is WMRR's, WCRA's and their respective members' strong view that the proposed orders and exemptions as currently drafted will significantly reduce recycling of mixed C&D waste, increase landfilling, economically impact the industry and jobs and increase the costs for the building and construction industry (commercial, industrial, infrastructure, residential) and households.

Concerns, Issues and Implications

Improvements have occurred

The EPA has indicated that the proposed changes to the recovered fines orders and exemptions are in response to its concerns about compliance with the existing orders, sampling practices, contaminants in process outputs and concerns that the recycled material presents a risk. However, in some cases the environmental and human health risks the EPA is purporting to address have not been properly communicated (See Risk section) and some changes proposed in the draft orders, such as the increase in chemicals and attributes to be analysed, (e.g., Acid Sulphate Soils and PFAS) have not been justified.

Since the introduction of the *Standards for Managing Construction Waste in NSW* (the Standards) there have been process changes made by C&D recycling facilities to improve performance and the protection of human health and the environment, including:

- A significant improvement in receival inspection procedures;
- Better source site controls due to non-compliant loads being rejected at facilities;
- Facilities have also increased their processing equipment investment resulting in a better-quality recycled product produced for market; and
- A number of operators undertake their own sampling of material to be received prior to its arrival at the processing site

The industry has implemented significant improvements in operations and infrastructure. The data the EPA is using to justify its decision to change the recovered fines orders and exemptions is based on outdated information and is not representative of the current practices of C&D recycling facilities.

Timing of proposed changes and implementation

The industry's view is that the timing of the proposed changes and commencement and the allocated time for response and adjustment was totally unreasonable and unfortunately reflects a pattern of lack of genuine consideration for and engagement with the industry or consideration of the information we have provided. The EPA has been reviewing the performance of the orders for nearly

three (3) years now, yet initially gave the industry only a matter of weeks to respond to the sweeping array current proposed changes. The original transition period of three (3) weeks was completely untenable, given the need for adjustments to sites to accommodate batching, testing and holding requirements, increased staffing needed, changes to systems for record keeping and pricing, notification to waste suppliers and product customers, and arrangements for existing contracts/supplies and stockpiles. We welcome the apparent change in the EPA's attitude, as indicated by Acting CEO Jacqueleine Moore, as an indication of a re-start to our relationship, and trust that it is genuine and will continue.

At its own significant costs, the C&D waste industry has been engaging with the EPA in good faith and doing the necessary work to better understand how to address areas of concern through quantitative analysis and assessment. For example, we have commissioned a number of reports including:

- Better Regulation Statement for proposed changes to recovered fines and recovered soils – Stage 1, The Centre for International Economics (CIE) (October 2021);
- Independent review: Reuse of recovered fines in NSW – Stage 1, Environmental Risks Sciences (EnRiskS) (October 2021);
- Economic and community impacts of asbestos regulations for construction and demolition recycling - The Centre for International Economics (CIE) (May 2021);
- Independent review: Asbestos in Construction and Demolition Recycling (Prepared for: Beatty Legal Pty Limited) – Environmental Risks Sciences (EnRiskS) (October 2020); and
- Submission to the EPA on its proposed revocation of the recovered fines order and exemption and a new recovered soils order and exemption (Oct 2021).

And more recently in response to the draft recovered fines and soils March 2022 orders and exemptions:

- Advice regarding technical aspects of the draft resource recovery orders and exemptions EnRiskS (March 2022).

As well as actively engaging and developing solutions for a more effective regulatory approach:

- Proposed an alternative waste classification approach;
- Developed a guideline for unexplained asbestos finds;
- Engaged in workshops with the EPA and separately across the industry; and
- Contributed to actions arising from those workshops.

As we stated in our October 2021 response, a decision of such importance must be informed by proper and thorough assessment of impacts, costs, benefits, and potential alternatives. We note that the EPA has not done a cost benefit analysis or regulatory impact assessment of its proposed changes. For this reason, a decision to commence any new orders and exemptions should be deferred until either:

- The completion of the Dr Cathy Wilkinson Resource Recovery Framework Review (the Wilkinson Review); or,
- At least nine (9) months have passed, to allow the C&D waste resource recovery industry to both construct and implement the necessary changes to their business models and practices.

This will somewhat ameliorate the detrimental effect of the changes; especially given the time it has taken to get to this point. It will provide the necessary time to address existing issues with clarity and develop practical alternative approaches that will be less impactful on the C&D waste management

industry and the building and construction industry, whilst maintaining an essential service and continuing to protect the environment and human health.

We have previously made the point that altering any of the resource recovery orders and exemptions whilst a review of the entire framework is underway is not only very premature, but likely to lead to more changes and possibly greater unintended consequences following that review. This is not only inefficient but extremely disruptive for business and the whole supply chain network, and provides no incentive for current and future investment in recycling infrastructure as identified by the WaSMS and *EPA Waste Delivery Plan*. The industry agrees that the framework is overdue for a thorough review as it is both cumbersome and not meeting its intended purpose (i.e., to beneficially reuse waste within a circular economy whilst being protective of human health and the environment). We remain eager to participate and provide our significant expertise to ensure NSW has an effective, best practice resource recovery and recycling industry. We propose an interim solution with a staged introduction that:

- Replaces continuous testing with batch testing;
- Implements the proposed sampling requirements including the role for a certified environmental practitioner, subject to some clarifications as identified later in this submission;
- Implements the notification, record keeping and reporting requirements, again subject to removal of some unnecessary elements and clarification of others; and
- Clarifies some of the proposed testing methods and sample sizes required for testing.

Further details are provided in the relevant sections of this submission and in the Recommendations section.

Summary Statement: **The industry has significantly invested in technology and equipment, changed practices and improved performance. Information used by the EPA on which to base its proposed changes to the orders and exemptions is outdated and not representative of current controls, practices, and results. Justification for the proposed recovered fines and soils orders and exemptions is lacking. The Wilkinson review of the resource recovery framework is underway, and it is premature to make changes to the recovered fines orders and exemptions without the benefit of its conclusions. Industry is very prepared to address appropriate concerns about safety and compliance while this review is underway in a staged approach. Any future changes to orders or exemptions must be supported by a cost benefit analysis or regulatory impact statement.**

Part A: Asbestos

In this report we have separated the asbestos related issues from those associated with the operational aspects of the orders and exemptions and the transition to their implementation. We have done this because without adequate, reasoned, and evidence-based consideration of the presence of asbestos in the resource recovery framework, the beneficial recycling and recovery of building and construction materials is fundamentally at risk. The C&D waste recycling industry is not the generator of the waste, and unless asbestos is properly managed at source and there is an appropriate risk-based approach to recycled products, the proposed requirements related to asbestos mean it is impossible to have a sustainable C&D waste recycling industry.

The EPA has acknowledged that "increasing asbestos detection at the 'front end' of the waste classification process is an important part of minimising waste containing asbestos being received at resource recovery facilities." However, its continued persistence in enforcing a zero tolerance/strict

liability approach, and inability to consider the actual risks is unacceptable to the industry, as it has the potential to end resource recovery and the recycling of recovered fines and soils in NSW.

Asbestos Requirements in the Draft Orders

The proposed recovered fines and soils orders Asbestos related clauses 3.3, 3.3.1 and 3.3.2 require all conditions to be met without exception, even where observation and testing (i.e., undertaking all due diligence) results in no asbestos found. Further, a failure by the supplier can result in the consumer not being covered by an exemption (cl 5.2.2 of the proposed recovered fines and soils exemptions).

Statements of compliance provided to consumers are also of no comfort, as regardless of test results recovered fines/blended recovered fines must not contain asbestos, and must not exceed the concentrations of other specified chemicals and attributes (cl 3.3 and 3.4 of the proposed recovered fines and soils orders).

This means that even if testing shows no indication of asbestos , and a non-compliance is later discovered, a consumer can lose the benefit of the exemption through no fault of their own and without any means of knowing there could be an issue. As such, an exemption would provide consumers with little confidence or no protection at all, effectively defeating its intended purpose. Further, it places a significant liability on a processor or supplier for any asbestos found after the product has been sold and in circumstances where the processor or supplier no longer has control over the product.

Requirements go beyond the POEO Act and are unworkable

The EPA has indicated that the clauses 3.3.1 and 3.3.2 are consistent with s144AAB of the *Protection of the Environment Operations Act 1997*. This is not correct, the obligation in clauses 3.3.1 and 3.3.2 are absolute and the prohibition in s144AAB is limited to where a person causes or permits the re-use or recycling of asbestos. That is, where a supplier has undertaken inspections and testing and not found asbestos it is reasonable to conclude they have not caused or permitted asbestos to be recycled if it is subsequently found. Section 144AAB is a more reasonable and fair position than the proposed requirements of clause 3.3 and its subclauses. Further, it would also be best practice policy to reflect the statutory offence and not in effect create a new offence through a subordinate instrument, such as a resource recovery order and exemption.

Clause 4.1.7(h) of the proposed recovered fines order states that “if the test results from the accredited laboratory show, or the generator suspects or ought reasonably to suspect, that asbestos is present in the batch of waste, then the generator must not supply the batch of waste …”. Clause 4.1.10(b) contains an equivalent condition in relation to test results and the exceedance of maximum average concentrations/values, and clause 4.9 also states that “a generator must not screen or otherwise process a batch of waste that contains, or that the generator suspects or ought reasonably to suspect contains, asbestos”. Clause 93(7) of the *POEO (Waste) Regulation 2014* makes it an offence for a supplier to contravene any requirement of a resource recovery order. The words “suspects or ought reasonably to suspect” are extremely problematic and open to different interpretations. We also understand the term ‘generator’ in this context means supplier.

These proposed clauses mean that suppliers (and possibly laboratories) are exposed to liability, notwithstanding the results of testing which may show no asbestos is present. Further, how that suspicion is supposed to arise independently of testing requirements is completely unclear. As identified below, asbestos is ubiquitous in the environment; does that mean a supplier “ought reasonably suspect” asbestos to be present in all waste delivered for processing? If so, the order as currently drafted is completely unworkable. Further the EPA’s draft orders as they relate to asbestos

make no scientific sense. Asbestos is in the air we breathe, particularly in urban environments and its presence in a sample for analysis or a recycled product may have nothing to do with the C&D waste stream.

Managing Finds of Asbestos and Asbestos Containing Material (ACM)

"We are all exposed to low levels of asbestos in the air we breathe every day." (enHealth 2013)

There are always a small number of asbestos fibres in the air we are all exposed to. The levels of fibres in the air need to be above background levels to be of concern. However, there are considerable differences in air concentrations across urban, rural or industrial settings, and indoor or outdoor settings. According to SafeWork Australia, the typical environmental background presence in outdoor air is 0.0005 fibres/mL and 0.0002 fibres/mL in indoor air, resulting in 5,500 fibres breathed by an average person per day.

Since around 2007 the C&D waste industry has been working with the NSW EPA to develop improved approaches to identifying and dealing with unexpected asbestos finds (the vast majority of which cannot be identified visually) in C&D waste that is received at waste recycling facilities. To improve our understanding and support a more considered and appropriate response to asbestos that is reflective of the actual risk the industry commissioned two (2) key reports which we provided in our October 2021 submission:

- *Independent review: Asbestos in construction and demolition recycling* Environmental Risk Sciences (EnRiskS) October 2020.
- *Economic and community impacts of asbestos regulations for construction and demolition recycling*, The Centre for International Economics (CIE) May 2021.

The industry also worked with Safework NSW in 2010 to produce the *Management of Asbestos in Recycled Construction and Demolition Waste Guide* and contributed to the development the EPA's 2019 Standards. The industry continued to work with the EPA to develop an Unexpected Finds protocol that has yet to be accepted.

Zero tolerance only applies to C&D waste material

The EnRiskS 2020 report examined the hazards, exposure and risks associated with asbestos, how this is managed in NSW and in other jurisdictions, the various regulatory definitions and approaches, detection limits (zero tolerance versus trivial levels), and how this is disconnected from other regulations and guidance in NSW. In particular the *Work Health and Safety Regulation* 2017 and *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM) and the EPA's regulation of air emissions of asbestos from stationary sources. The conclusion is that the requirement for zero asbestos appears to only apply to C&D waste recycling facilities in NSW. Further, the EnRiskS 2020 report indicates that there appears to be no practical understanding by the EPA of how difficult it is to inspect mixed waste to guarantee that asbestos is not present, especially small fragments (<2-3mm) of ACM, and that recyclers are bearing the responsibility for asbestos found in waste that has been cleared at point of generation on construction sites in NSW. The industry view is that many of the EPA's safety concerns can be resolved by treating asbestos in waste material as a supply chain problem, starting at the point of generation with the correct classification of material, alongside a workable Unexpected Finds procedure.

The CIE May 2021 report looked at the impacts on the industry due to its inability to meet the EPA's zero tolerance approach to the presence of asbestos, and assessed the economic, social and environmental consequences of three alternative options for managing asbestos in C&D waste. It further examined the direct impacts on the C&D waste recyclers and construction sector from each,

the costs of alternatives to manage unexpected asbestos finds, and the economic consequences of increasing costs for the industry and the costs of reduced C&D recycling. It concluded that the EPA's approach to managing asbestos would impose direct costs of $35.1 million for C&D recyclers due to extra costs related to disposal of more material, engaging hygienists more frequently, and the disruption to site operations. Conversely, the report provides an alternative approach supported by the industry and estimates the costs at $1.7 million.

It is common for bonded ACM to be treated differently from friable asbestos as it usually poses a very low health risk. A recent update from the Western Australian Department of Health noted that site assessments have supported the assumption that bonded ACM fragments pose only a minor risk (EnRiskS 2021).

Regulation must reflect actual risk

It appears that the EPA has not taken these studies and their conclusions into account in formulating the proposed asbestos related recovered fines and recovered soils requirements. Or if it has, how the current proposed requirements have been determined and if there has been any consideration of the regulatory impacts and actual risks.

Asbestos is part of Australia's built environment, reflecting a long history of the use of asbestos as a building material. Even if all safe management and handling requirements for possible asbestos or ACM are complied with at the demolition and construction stages, it is not surprising that asbestos or ACM may be found in C&D waste delivered to processing facilities for recycling. Asbestos may be present in such waste due to:

- Mixing in of small amounts of bonded asbestos from demolition with materials to be sorted and recycled;
- Being naturally present in the soil where a building is being demolished or constructed; and
- The settling of existing asbestos fibres in the atmosphere.

The background presence of asbestos fibres in the air means the concept of zero asbestos or zero asbestos exposure is meaningless. The industry has been working with the NSW EPA for many years to develop an appropriate protocol or procedure to identify the potential for asbestos to be present in C&D waste and how best to manage that during the recycling process.

Different types of asbestos pose different levels of risks to workers and the community. Asbestos in bonded materials (e.g., cement sheeting) poses the lowest level of risk whilst loose fibres, such as those present in friable asbestos, can move readily into the air and pose the highest level of risk.

For C&D waste material, there is a low potential for friable asbestos to be present if the materials are managed correctly at the point of removal from structures or buildings, as per current legislated requirements. The most likely form of asbestos encountered in C&D waste is bonded asbestos which presents a low risk, unless it is mechanically damaged.

To date, there is no consistent threshold which defines asbestos waste across jurisdictions in Australia. Western Australia is the only state to provide a contamination criterion, of 0.001 per cent (weight for weight), which has been adopted as best practice in Northern Territory and Queensland.

Proposed changes are out of step with other NSW regulatory frameworks

The NSW EPA's zero tolerance approach to the regulation of asbestos in C&D waste is inconsistent with other NSW requirements. For example, the *Work Health and Safety Regulation* 2017 does not require zero asbestos post the removal of asbestos and allows for soil to include trace amounts of

asbestos, which is defined as <0.01% w/w. For contaminated sites assessment NSW uses the NEPM which has a risk-based assessment approach for the presence of asbestos in soils in different land use settings. The planning framework in NSW including through the provisions of SEPP 55, the Standard LEP and DCP conditions and construction certificates also uses a risk-based approach to assessing the presence of asbestos and managing its safe removal and disposal during demolition and construction activities. See further discussion on this aspect below. The requirement for zero asbestos appears to only apply to C&D waste recycling facilities and their products.

Policy and legislative change are needed to provide certainty

If the EPA believes that due to the wording of the provisions in the *POEO Act* (1997) that relate to 'asbestos waste', there is no other option than to employ a zero-tolerance stance to asbestos, the industry encourages and supports the NSW Government acting to address this through legislative change as a matter of urgency so that it is consistent with the way risks from asbestos are addressed in other NSW regulatory frameworks such as contaminated sites, development consent and work health and safety. Such legislative and policy reforms must reflect the following:

- Asbestos is naturally occurring and has been widely used which means it is highly likely that any soil sample could contain a small amount; and
- For the recycling of C&D waste to occur the potential for asbestos to be present needs to be controlled at source and properly and professionally removed as is currently required in NSW.
- The current zero tolerance approach to asbestos if continued would extend beyond recovered fines and soils to impact other areas of recycling such as recovered aggregates, compost and organics as there are likely to be background levels of asbestos in the source materials.

Summary Statement: **Asbestos is ubiquitous in the environment, and we are all exposed to a small amount in the air we breathe. Small amounts are likely to be present in any soil sample, but bonded asbestos is likely to pose only a small risk of exposure. Asbestos contamination must be dealt with at source and current NSW requirements for asbestos management, handling and assessment address this. Any limits set for asbestos must properly reflect the risk.**

The NSW EPA must continue to work with industry to finalise a protocol for managing unexpected finds and/or presence of asbestos that is reflective of the levels of asbestos in the environment. The NSW EPA should also recognise the levels that are set in relevant planning and work health and safety legislation and be consistent with these, given that the recycling industry is a part of the broader development framework, which sets appropriate standards for these materials. Further, if it is in fact the EPA's position that it has no option but to enforce a zero level of asbestos under the POEO Act, the NSW Government must act to address this to ensure a consistent position with other NSW agencies and regulatory frameworks.

Part B: Operational Matters for Processors/Suppliers

Sampling, Testing and Validation

The industry is concerned that the EPA's evidence base for this decision is predicated largely on the results of an investigation that has used 2017- 2018 data and site sampling that occurred in October 2019. This analysis does not take into consideration the implementation of the Standards and associated investment by facilities from 2019 onwards. The industry has been diligently applying the Standards since they were introduced. The Standards were intended to improve the management of

C&D waste at processing facilities and assist with the identification of contaminants of concern, especially Asbestos Containing Material (ACM).

The fine material resulting from the processing of mixed C&D waste will be highly variable given the variability of the inputs. On any given day the material received at processing facilities may have more or less fine soil, small pieces of concrete, plaster and paper.

There is significant ambiguity around the testing and sampling regime that is proposed in the draft recovered fines and soils orders. This includes particular chemicals and attributes (now proposed to increase by an additional 9 to a total of 32, many without justification or explanation), analysis and methods, testing time and laboratory sample management, how and when notification occurs, and the EPA's consideration and assessment of that notification (that is, what action it proposes as a result). Industry has demonstrated its genuine commitment in working collaboratively with the EPA to reach a satisfactory outcome, and we wish for this process to be recommenced. The EnRiskS (2021) report that formed part of our October 2021 submission concluded that the variability in compliance by facilities that the EPA found in its investigation is reflective of the lack of clarity and purpose in the current orders, in particular:

- the context for the chemical and physical contaminant limits;
- how these limits fit with other regulatory requirements and guidance for example, contaminated sites assessment and other resource recovery orders and exemptions that apply to the C&D waste recycling industry;
- how limits were determined and what they are aiming to be protective of;
- the lack of connection to and consideration of background levels for key contaminants;
- lack of clarity around definitions, for example what is meant by batch process and sampling requirements (densities and methods); and,
- the size, number, and quantity of samples required to be taken and stored, as well as the proposed bespoke procedures of some.

Notwithstanding these conclusions, the proposed recovered fines and soils orders perpetuate all of the same issues and add some new ones, as identified throughout this submission, and in the EnRiskS (2022) review of the chemical parameters, sampling, testing, and methodology attached at Appendix A.

Concentration Limits

The industry is unsure what problem the EPA is addressing with some of the expanded chemicals and attributes that are proposed. Our view is that the current order's contamination levels can be and are most often met. In particular the EPA has not justified why Acid Sulphate Soils (ASS) and PFAS testing is required. ASS in particular are highly unlikely to be contained in C&D waste. The addition in cost for sampling and laboratory analysis (e.g., $75-130 per ASS sample, see Appendix A) for these parameters given the very limited likelihood of their presence in C&D waste is unnecessary and makes this material uncompetitive with landfilling.

As we suggested in our October 2021 submission, comparisons with the NEPM HIL-A levels (the most stringent) and which are designed to be protective of human health suggests that current contamination levels are not likely to result in significant harm to human health. There are rarely any contaminants in the products that exceed the maximum levels. Thresholds in the proposed recovered soils order are more stringent for almost all contaminants in the existing recovered fines orders, which in turn are stricter than NEPM HIL-A levels. Further, perceived impacts of plastic or other foreign

materials entering the environment are not likely given the product's use, incorporation into the soil and lack of opportunity to mobilise given it is mostly subbase and appropriately covered.

The EnRiskS report included in that the same submission found that for chemical contaminants the limits currently applied to recovered fines and proposed for recovered soils are the same or much lower than the limits applied to:

- backyard soils in contaminated land assessments;
- composts, soil conditioners and mulches;
- excavated natural material and recovered aggregates; and
- wastes for disposal to landfills where there is limited engineering.

It is noted that in particular the chemical contamination limits applied to contaminated sites assessments are specifically calculated to consider exposure to people who would come into daily contact with the materials during gardening and growing produce as well as for ecosystem impacts.

The evaluation of potential exposure pathways indicates that for all uses of recovered fines materials:

- exposure to people is likely to be limited;
- exposure to aquatic organisms is likely to be limited; and
- exposure to terrestrial organisms is possible but likely to be limited especially if these materials are placed at depth.

Further it is important to consider background levels when setting limits for asbestos and chemicals such as lead and Benzo(a)pyrene to ensure they are reasonable and achievable. For example, lead will be present in C&D waste because it naturally occurs in soil and rocks, is present in historical fill materials, has historically been deposited from motor vehicle air emissions and chips of paint from demolition materials. This is especially so in urban areas of Sydney. C&D waste that arrives for processing at recycling facilities reflects the built form, location and environment that it is recovered from, and this can be (and should be) accommodated in the development consent process and assessment stages which determines the classification of the waste. It should not be duplicated at the recycling stage adding cost to both the construction and resource recovery industries.

Stockpiling, Batching, Record Keeping and Reporting

The requirements in the recovered fines and soils orders for stockpiles and batches are extremely problematic with respect to available space on processing facilities to hold segregated batches whilst they are sampled, laboratory tests are undertaken, and non-compliant batches are either subject to further testing or separated for disposal. Operators typically hold 500 to hundreds of thousands of tonnes of C&D waste material (unprocessed and processed) on site at any given time and would not be able to easily or quickly expand their sites without significant costs. EnRiskS (2022) estimates the suite of chemicals required to be tested by a NATA accredited laboratory will take up to five (5) working days. This is on top of the time it will take processors to arrange for an available CEP to undertake the sampling, recording, labelling, photographing and assessment of results.

Even if additional land can be acquired for these purposes the additional costs on top of the costs of the proposed requirements (calculated at being over $1,000 per sample, see EnRiskS report attached as Appendix A) will make C&D recycling commercially unviable. This will be more acute for operators with smaller premises. Further, the sample sizes proposed by the regime (up from 100g to 8kgs) and the methods proposed also will require laboratories to have storage space for six (6) tonnes of material, which is extremely problematic if not impossible.

Further, testing methods requested by NSW EPA do not accord with Australian Standards, and it is unclear whether laboratories will be able to gain NATA accreditation for these methods (which can take up to nine (9) months to achieve). In order for laboratories to do the testing, they have to be NATA accredited. It is unclear how this system can therefore operate effectively given this lack of certainty.

Whilst the industry supports the need for proper administration of processing on-site, and transparency provided through accurate record keeping and reporting, the requirements around these site operation aspects are overly prescriptive, onerous, and in some cases unworkable. For example, the requirement to provide updated maps of stockpiles and batches is unworkable at most sites where this changes frequently. Based on considerable experience, the industry believes that the recording, registering, and labelling of stockpiles is sufficient to track them.

The requirement to provide the results of sample analysis to all customers is unnecessary, especially for those operations that have hundreds of customers, some whose transactions are COD. We contend making this available on the company website should satisfy transparency, as is the case with other EPA regulated industries and EPL holders. We are also keen to understand how the EPA proposes to use and respond to the information processors have to provide. To date, this remains unclear.

Summary Statement: Industry has made improvements to practices since the implementation of the Standards. Proposed limits for chemicals and attributes in the fines and soils orders should be reasonable, achievable and measurable, reflective of background levels and risk of exposure. The proposed orders require analysis, methods and limits of reporting that are incorrect, out of date or unnecessary given the unlikely presence of some listed chemicals in C&D waste. Stockpile, record keeping, reporting and notification requirements are unnecessarily prescriptive and add to the substantial costs of the sampling and analysis of the increased suite of chemicals and attributes.

Contamination is a Supply Chain Issue

Contamination is not created by C&D recyclers. Contamination levels in C&D waste that affect processing operators and recycled products are a supply chain issue that needs to be addressed by the construction industry, households and government. There is a clear role and responsibility for government and the EPA to educate the sector and the community to improve behaviours. It is analogous to organics, where government has mandated source separation for householders and some businesses to ensure best practice removal of contaminants and beneficial reuse of a resource. Government is supporting these changes through legislation, education, and financial support to reduce contamination, increase reuse of valuable resources, and avoid landfilling. A similar approach is needed to improve resource recovery in C&D waste.

Waste processing facilities primarily sell recovered fines to suppliers of such materials who then on-sell for landscaping or construction purposes. In practice, the NSW framework is particularly focussed on controlling the recycling process rather than the circumstances and context within which the end product is intended to be used.

In contrast to NSW, other leading jurisdictions take a risk-based approach that has a greater focus on outcomes rather than process. For example, both Victoria and South Australia have regulatory frameworks that are cognisant of the end use for recycled products and have systems designed to facilitate safe use of recycled materials. Their systems define the material as fill or recycled aggregate and, whilst protecting human health and the environment, also facilitate the use of a valuable resource, recognising the actual use of this material and the risk involved.

In Victoria fill material is defined in regulations and an authority is provided to use the material in certain settings provided it meets specified contamination limits. Also, a general environmental duty applies to all Victorians requiring the reduction of risk of harm from activities. In South Australia waste from building and construction activities is classified as *clean fill* (includes soils, processed C&D waste and industrial residue) or *intermediate waste soil* used for construction fill purposes

The current review of the EPA's resource recovery framework by Dr Cathy Wilkinson is the opportune time and process through which to address these fundamental aspects of resource recovery. It is important to look at the whole supply chain from waste generation, through processing to end use of recycled materials as well as their intended use, risks posed and exposure pathways. The Wilkinson Review must consider this, and the EPA needs to accept responsibility for a targeted, well-designed education campaign about the benefits of source separation and contamination reduction. It is critical to improve the issues affecting the supply chain in order to achieve better environmental and circular economy outcomes, and meet the NSW government waste diversion and recovery targets. Changes to individual Resource Recovery Orders and Exemptions should not pre-empt or undermine the Wilkinson Review's outcomes and findings.

Our view is that some operational changes can be made by facilities (e.g., batching, sampling, testing and record keeping) to provide increased assurance for the EPA that the industry is compliant, that products are fit for purpose, and that the environment and human health are protected. However, the current draft recovered fines and recovered soils orders go beyond this. They are not reflective of risk, and if introduced will seriously affect the viability of the industry.

Summary Statement: **The entire supply chain for recovered mixed C&D waste must be considered in determining changes to the resource recovery framework in NSW. The NSW resource recovery framework and the way it is applied by the EPA does not take a proportionate approach to risk as applied in other leading jurisdictions and is overly focussed on process not beneficial recycling outcomes. The Wilkinson Review should examine the flow of waste material from generation to beneficial reuse and how risks are assessed and regulated. Changes to Orders and Exemptions should not pre-empt the outcomes of the Review. The EPA and the C&D waste recycling industry can agree on practical, justifiable changes as we engage with the Review.**

Unnecessary Duplication with the NSW Planning System

The proposed requirements in the recovered fines and soils orders that relate to testing and analysis are unnecessarily duplicative of the NSW planning system in many aspects. The most common source of C&D waste that arrives at recycling facilities for processing is from building and construction sites. There is a rigorous and multi-layered assessment and approval system in NSW that applies to demolition and construction activities and their approval by planning consent authorities. The planning system includes laws, rules and controls that apply to demolition and construction of buildings including under the *Environmental Planning and Assessment Act 1979* and its subordinate regulations, State Environmental Planning Polices (SEPP) including *SEPP 55 – Remediation of Land*, the Standard Instrument - Local Environmental Plan and local council Development Control Plans (DCP).

In most instances DCPs require applications for development, including demolition, construction and ongoing use of a site to provide a Statement of Environmental Effects (SEE), including a waste management plan. Applicants seeking approval to demolish or construct buildings are required to provide at a minimum a SEE that includes how site contamination, asbestos and acid sulfate soils will be managed. Applicants are also required to include a Waste Management Plan. Further to the

planning laws, site contamination assessment is subject to the requirements of the *Contaminated Land Management Act 1997* and asbestos assessment and management to the *Work Health and Safety Regulation 2017*.

We also note that the Registered Environmental Assessment Practitioner (REAP) scheme introduced under Planning Circular 21-005 by the Department of Planning, Industry and Environment for certification of Environmental Impact Statements for state significant development and infrastructure provided a 12-month timeframe for commencement. It appears the EPA has adopted this quality assurance approach for the Certified Environmental Practitioner (CEP) role as per the proposed recovered fines and soils orders. However, in contrast to the REAP scheme, there is no recognition by the EPA of the time it may take suitably skilled, qualified and experience individuals to become certified. Further the EPA has not clarified precisely the role of the CEP, especially with respect to whether the CEP oversees and signs-off on the requirements, or actually undertakes them. This has particular implications for availability and cost of CEPs.

Site Contamination – involves an investigation and assessment of the site or land to determine the level of contamination. A site investigation considers past and present activities on or adjacent to the site, groundwater, surface water and sediments, identification of potential contaminants, an assessment of the nature, degree and extent of contamination, and assessment of the potential for harm and possible exposure pathways. Where chemical assessment is required, it is undertaken in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM). The ASC NEPM appears to be the basis for the chemicals and attributes required by the EPA to be sampled and analysed under the proposed fines and soils orders. A number of the chemicals and attributes are not required to be sampled under the current fines orders and are unlikely to be present in most C&D waste material that arrives for recycling at processing facilities. For example, the orders require testing of organochlorides that have been banned in Australia for 25-40 years, chemicals that were never used in Australia and others that are very unlikely to be present in material that largely comes from urban environments (e.g., pesticides and fungicides).

Acid Sulfate Soils – these are naturally occurring material from historical sediments that are generally only present in coastal areas or close to major waterways, and are usually at depth. There is no evidence that ASSs are an issue in C&D waste material; years of testing suggests the material is alkaline not acidic. There should not be a requirement to consider ASS in C&D waste that comes from areas that do not contain this material. As identified above, it is a requirement for development applications in NSW to assess the presence of ASS, prepare a management plan and properly dispose of them. The EPA's own classification guidance for these materials places strict requirements on how ASS is to be managed and disposed. The sampling and testing of ASS is not required in the current fines orders and the EPA has not provided any justification for their proposed inclusion in the new fines and soils drafts.

Asbestos – DCPs require the removal, handling and disposal of asbestos from demolition and building sites to be carried out in accordance with the requirements of the *Work Health and Safety Regulation 2017*. The details of the method of removal are required before demolition works can commence. DCPs generally also require that demolition of buildings and structures that are suspected of containing asbestos must comply with Australian Standard 2601-2001 demolition of structures. A demolition work plan is usually required that amongst other things, has the details of the asbestos removal contractor, details of the actual or suspected asbestos containing material, the demolition/removal methods to be used, health and safety measures and the location for disposal. Further, the Safework NSW *Code of Practice for Demolition Work* also refers to assessing and managing risks from asbestos.

Not only are many of the proposed chemical sampling and testing requirements in the recovered fines and soils orders unwarranted and unjustified from a scientific and risk perspective, they would require C&D waste recyclers to undertake actions and incur costs unnecessarily. The EnRiskS (2022) review commissioned by the industry (Appendix A) provides more details on the specific chemicals and the likelihood of their presence in C&D waste material, concerns about methods prescribed for testing and the practicality of the concentration limits and tests.

Summary Statement: The EPA's proposed recovered fines and soils orders do not reflect the laws, requirements, rules and controls that apply to C&D waste at the source of its generation, that is building and construction sites. There are rigorous requirements to assess contamination and hazards before consent authorities approve such activities and the orders as drafted are unnecessarily duplicative of the NSW planning system requirements and will result in unjustified costs for the industry and consumers.

Retrospective Impact

The proposed changes will have retrospective impacts alongside those identified in the previous sections of this response. Across the industry there are currently stockpiles of processed or partly processed C&D mixed waste on processing facility sites and possibly at re-sellers' sites. There are also skip bins on building and construction (from commercial to household) sites across the state that are holding material to be transported for processing. The waste material continuing to be generated and stored on building and construction sites has grown throughout the time the EPA has been considering firstly the revocation of the recovered fines orders, and now amendments to them. Similarly, finished product is likely to be currently stockpiled on consumers sites awaiting use as turf underlay, subbase and fill. This raises a number of questions we presume the EPA has considered, but there has been no communication or indication to the industry as to how this will be managed and by whom. For example:

- How does the EPA propose to deal with existing stockpiles and stored materials if the orders and exemptions are amended as proposed?
- What will be the fate of processed and recycled material that is now or soon will be, in situ?
- How will this be communicated effectively to both ensure compliance and alleviate concerns for all stakeholders?

These are similar issues to those that arose when the EPA revoked the MWOO order that affected the AWT operators and their customers. The EPA established support systems and communications to stakeholders to provide advice and financial support to dispose of the resulting non-compliant material as well as changes to the waste levy to allow disposal of no longer compliant material. The EPA should provide a similar response if the recovered fines orders and exemptions are amended as currently proposed.

***Summary Statement:* There may be significant quantities of recovered fines and recycled products stockpiled on building and construction sites, processing facilities, re-sellers and consumer sites. If the recovered fines orders and exemptions are amended as proposed, what will be the status of these materials be and how will they be managed? The EPA at the least should provide assistance and support to manage these stockpiles as it did with the MWOO revocation including removing the waste levy for material that is no longer exempt.**

Risk based approach should be used

The concept of defining pollution based on its potential to cause harm is embedded within NSW legislation and guidance that the EPA administers and forms a basis upon which regulatory action is determined.

Any risk assessment should incorporate an understanding of the hazard associated with a substance, and the knowledge and assessment of any potential exposure pathways. This process should specifically address how someone may come into contact with a substance, how frequently, and for how long. This is to determine if the dose or exposure is sufficiently elevated to result (or potentially result) in adverse health effects. This relationship is the key to being able to quantify hazards, and therefore how the risk should be avoided or ameliorated. Taking into account the generation source of waste material and the fate of products from recycled C&D waste is necessary in framing the controls for their production and use. Limiting chemicals of concern is obviously critical but limits set in regulatory instruments must reflect the ultimate end use of the product and potential exposure pathways. If recovered fines are processed into products that are used as subbase or engineering fill, the exposure pathway is low risk (EnRiskS 2021).

The EPA Is concerned about the results of its 2019 investigation, and has suggested changes to the resource recovery orders and exemptions to address its concern by first indicating it would revoke the recovered fines orders and exemptions, and now introducing an amended batch recovered fines order and soils order. However, it is not clear exactly what risks are being addressed through the new recovered fines and soils orders and exemptions. This material, in many instances, is being used as fill and is not going to have any human contact or likely exposure pathway. Proportionate levels should be set based on the end use of the material.

It would appear that the NSW EPA is using the same criteria for both recovered fines and soils. If there is a need, which we don't believe has been established, for two separate orders and exemptions the requirements must reflect the nature of the risk and controls needed, depending on the end use of the recycled product. Similar to other activities the EPA regulates, an exceedance of a concentration level doesn't necessarily mean there is a health or environmental impact. A risk-based approach would take into consideration the characteristics of the material, how it was being used, and the likelihood of mobilisation.

Further, depending on the location that material is excavated from, there may be high background levels of some pollutants (e.g., Western Sydney and lead) and others may not be present at all (e.g., acid sulfate soils). The EPA's approach of simply changing the concentration limits for certain chemicals and adding new ones without reflecting the source of the material, treatment process, end use or cost of testing is simplistic and fails to address actual risk, intended use of the product or the objectives of resource recovery and a circular economy.

The industry has developed an alternative integrated framework and provided it to the EPA for consideration. Our proposed Waste Classification and Resource Recovery framework that was included in our October 2021 submission has a risk-based approach that focusses on the source or generation of the waste material, how it is then classified based on scientific evidence (e.g., VENM, ENM soils, homogenous C&D waste, mixed C&D waste), the processing or treatment it undergoes, and its end use (e.g., topsoil, engineering fill or disposal to landfill). The proposed framework is attached at Appendix D.

Summary Statement: **Rather than amending or creating orders and exemption for different aspects of C&D waste, the EPA should develop an integrated risk-based framework for recovered C&D waste materials that focuses on the source or generation of the waste material, how it is then classified based on scientific evidence e.g. VENM, ENM soils, homogenous C&D waste, mixed C&D waste, the processing or treatment it undergoes and its end use e.g., topsoil, turf underlay, landscaping, engineering fill or disposal to landfill.**

Clarifications and Ambiguity

Throughout the orders and exemptions there are terminology issues or problematic language used and we request the EPA works with us to provide suggestions to improve understanding and readability.

For example:

Preamble wording – the language used in the preambles for both fines and soils orders and exemptions is emotive, and not reflective of the products produced by the C&D recycling processes and how they are used. It undermines the value of the products and resource recovery and paints an unduly negative picture for the consumer. For example, words like "concerned" and phrases indicating no guarantee that human health and environment are protected or that the risk of harm is reduced even if the orders and exemptions are complied with, and products are to be used at your own risk not only undermine recycling but the whole regulatory framework and are completely unnecessary. This wording is in direct contrast to the EPA's 2017 *Guidelines on resource recovery Orders and Exemptions: For the land application of waste material as fill.* The opening statement of the Guidelines is that:

Fill materials are a valuable resource that play a pivotal role in the construction and infrastructure sectors, and are fundamental to the growth and prosperity of the NSW economy.

Confusing and at times interchangeable use of terms – such as generators, processors and suppliers, and users of recycled material, that seems to reflect a lack of understanding by the NSW EPA of the industry and the supply chain for recycled products. Generators are the source of the creation of the waste (for example at construction sites), processors operate facilities that process the waste through recycling and provide products for sale to suppliers and end users. A processor may also be a supplier. The misuse of these descriptors creates confusion about responsibilities in the orders and exemptions.

Recovered resources aren't waste - The industry has previously raised the issue of referring to recycled material as waste rather than a recovered resource, and how this language establishes a mindset that means that even when resources are recovered, they are still viewed as waste by the regulator, and this shapes policy development and regulatory approach. This a fundamental starting point for a more considered, professional, and ultimately beneficial approach to a circular economy.

Role of transfer stations – it is unclear what regulatory requirements apply to material sorted at transfer stations or handled by on-sellers. Are on-sellers *suppliers* as defined in the orders?

Licensed versus non-licensed facilities – there seems to be a different approach taken for environment protection licensed (EPL) and non-licensed facilities and the justification is not evident. First notification appears to aimed at the EPA establishing a record of processors but this isn't necessary for EPL holders. Strangely, non-licensed facilities do not need to meet some of the strict requirements (Cl 4.1.10) proposed for those holding an EPL (e.g., requirements for non-compliant batches and notification of tests results to EPA). What is the rational for this?

Chemicals, analysis and methods – the EnRiskS review (Appendix A) provides a detailed analysis and assessment of the parameters, methods and requirements for the listed chemicals and test methods and the applicability of these to C&D waste. It also provides context about laboratory accreditation, issues associated with the prescribed methods and those accreditations and the time it will take for laboratories to establish methods, equipment, testing procedures, and secure accreditation. It details the time the required tests will take (at least 5 days) and the challenges laboratories will face in holding samples of the size required by the orders.

Certified Environmental Practitioners and NATA accreditation – what is the basis for the CEP requirements and what evidence is there to support the introduction of this as proposed? Is there a large enough pool of currently certified practitioners? Can the EPA confirm that people with the requisite skills and training that may currently have certification under the schemes identified also have the requisite knowledge of waste and waste classification as required? Our considered view is this is highly unlikely and it will take time to establish and we note the REAP scheme introduced by DPIE allowed 12 months before implementation. NATA accredits laboratories to undertake specific test methods. The requirements don't seem to recognise this. As identified by EnRiskS (see Appendix A) this creates issues for processors, such as delays and costs, and issues for the laboratories if they follow the methods required by the EPA that are not accredited. See Appendix A for more detail.

Definitions of product uses – the recovered fines exemption restricts the use of products to *earthworks*, which is defined as "*filling to achieve the required topography"* and the recovered soils exemption restricts the use of products to *earthworks* and *engineering fill*. These terms are not well defined, and it is not clear whether or not current major product uses such as for landscaping and turf underlay are included in the definitions. We would understand that these uses are included as they are used to achieve a particular topography. Further, engineering fill and material used to achieve a certain topography are potentially one and the same thing. Why is the term *engineering fill* only applied to recovered soils?

Exemption condition for users - The reference to "*all necessary development consents*" in 5.1.1(a) is unnecessarily limiting. Not all lawful development requires consent. For example, approvals for infrastructure projects under Part 5 of the EP&A Act do not require consent. These projects could not meet the Exemption because they do not hold development consent. Planning instruments can also exempt certain development for the requirement for consent. The words "if required" could be added to the end of the sentence to make this clear.

Summary Statement: **Clarifications are required and ambiguities need to be properly resolved for many aspects of the orders and exemptions. Without this compliance is difficult, stakeholders are unsure of their responsibilities and regulation is uncertain. It is also unnecessarily costly for processors, suppliers and consumers.**

Recommendations

The industry is strongly of the view that there are alternatives to the changes proposed by the EPA, and if implemented as drafted the recovered fines and soils orders and exemptions are unworkable. They will result in significant market disruption, increased costs to the community, industry, and consumers, increased landfilling, and increased illegal dumping. Many of the requirements in the draft orders are not scientifically accurate, are not able to be complied with, or will result in unnecessary and unjustifiable costs to the industry and consumers.

As such we make the following recommendations:

1. Urgent engagement must commence with the industry, scientific experts and other key stakeholders such as the NSW Asbestos Coordinating Committee to determine a sensible and justifiable legislative, policy and regulatory approach to waste materials that potentially contain asbestos to ensure human health is protected and actual risks are reflected in how it is managed.
2. The finalisation of the proposed changes to any Resource Recovery Orders and Exemptions, including for recovered fines or soils should await the conclusions and findings from the Wilkinson Review of the resource recovery framework in NSW. In the interim the industry supports the implementation of staged improvements to the recovered fines and soils orders and exemptions including:

- Replacing the current continuous and batch testing orders and exemptions with batch testing only;
- An approach to asbestos based on an agreed unexpected finds protocol, national standards (ASC NEPM, AS 4964-2004) and the NSW *Work Health and Safety Regulation 2017*, and recognition of the NSW planning requirements and development controls, instead of a strict liability approach (and if necessary, legislative changes to the POEO Act and "asbestos waste";
- Implementing the proposed sampling requirements including the role for a certified environmental practitioner (CEP), subject to clarification of the issues identified in this submission;
- Implementing the statement of compliance as well as the notification, record keeping and reporting requirements, subject to removal of some unnecessary elements and the clarification of others as identified;
- Until there is assessment of the risks and rationale for inclusion of new chemical and attribute requirements and agreement on the these, implement the chemical and attribute limits as per Table 1 of the current 2014 batch process recovered fines order (noting resolution of the approach to asbestos as above);
- Allow a minimum of 12 months for the implementation of a CEP scheme to provide adequate time to ensure there is an available pool of certified professionals (at least 12 months) and that the role and responsibilities are more precisely articulated; and,
- Clarification of and changes to the proposed testing methods, and sample sizes required for testing as per below.

3. Changes to chemicals and attributes, sampling analysis and methods, limits of reporting, and laboratory operations should not be determined without proper consideration of the contamination risks and confirmation with laboratories and NATA about the practicalities of the changes. This applies equally to understanding the impact on laboratories (including sample size management, new equipment, staff availability, training).
4. Where C&D waste is generated from a site that is subject to the NSW planning regime including local council Development Control Plans (DCP) and there has been consideration under planning controls and work health and safety laws for site contamination, acid sulfate soils, and asbestos assessment and removal, no further analysis should be required at the C&D recycler/processor facility. The industry will work with the EPA to ensure suitable written records are available to confirm compliance.
5. The NSW government, perhaps through the Asbestos Coordinating Committee, must develop and deliver an education and behaviour change program for the construction and home

renovation industry to improve understanding of different waste streams and how to undertake better source separation. This should be done in conjunction with the waste and resource recovery industry.

Broader matters for discussion

The following should be the subject of further discussion with the industry and other stakeholders such as environmental practitioners, laboratories, and accreditation bodies. Some aspects were raised in our October 2021 submission, but still remain valid with respect to the latest proposed changes to recovered fines and soils, as to date they have not been adequately addressed or responded to.

Amendments to current draft orders and regulatory practice:

1. As identified changes are needed to the draft orders with respect to, testing, chemical and attribute limits and sampling regimes/frequency, as well as the responsibilities of CEPs and laboratory requirements. For example, instead of the proposed requirements, the CEP could be responsible for developing the sampling plan (perhaps agreed to be the EPA), the company could implement it and the CEP would periodically audit compliance and report on this. This is a more efficient and practical way to achieve the EPA's objective of increased rigour in sampling and testing and reflects other such independent environmental investigation and assessment schemes.
2. We also seek agreement on, and implementation of the industry's previously suggested Unexpected Finds Protocol and an agreed period, for example two years before any review, to allow the industry time to put systems and equipment in place and apply the new sampling regimes.
3. The EPA needs to be a more active regulator and undertake regular auditing and compliance and enforcement to ensure the regulatory framework for resource recovery is achieving its purpose. The EPA should monitor industry compliance closely with the revised order and seek feedback on any adverse impacts whilst the broader resource recovery orders and exemptions framework review is finalised. If amended recovered fines and soils orders are implemented these must be able to be grandfathered once the broader review of resource recovery order and exemption framework is completed. As we expect further changes will be needed.

Consider Regulating via Licencing

4. The majority of C&D recyclers hold Environment Protection Licences for their activities. Along with or instead of changes to the resource recovery orders we suggest existing Environment Protection Licence (EPL) conditions could be used to apply a Pollution Reduction Program that has the elements of No. 1 and 2 above. This is a more efficient way to ensure operators understand their responsibilities and usual EPA regulatory processes like inspections, annual licence returns, and regular licence reviews will identify non compliances in a more timely and systematic way so that corrective action can be taken. It would also place resource recovery within the risk-based approach that has proven successful for EPLs.

   This would mean that the EPA would not need to establish a specific regulatory approach to compliance for resource recovery orders as it could utilise current practices and procedures. It would also mean the statutory service delivery and appeal processes would be available to the licensee, making for a more timely and transparent approach to changes and greater certainty for investment. This approach would facilitate clearer regulatory requirements ensuring that operators understand what is required of them and the EPA can better assess

compliance and take appropriate action where necessary. For example, an Unexpected Asbestos Finds Plan could be a licence condition and accordingly operate in the same way as the current Pollution Incident Response Management Plans (PIRMP).

Depending on the desired scope of this approach, it could mean that licensing thresholds may need to change to capture smaller waste sorting operations, such as those associated with some skip bin services. This would accord with the *Waste and Sustainable Materials Strategy* and the *EPA Waste Delivery Plan's* indication to strengthen the regulation of illegal dumping and waste crime, and extend licensing requirements for waste transporters. It may also require the Resource Recovery Exemption to operate more like the Victorian EPA's Determinations. These Determinations are an outcomes-based approach that takes risk into account by setting the rules for safe recycling products and providing assurance to consumers that there is a robust regulatory framework supporting a fit for purpose product as long as it is used as intended.

Transitional Requirements

Implementing the proposed changes for recovered fines and soils will mean the construction industry, households, the C&D waste industry and the NSW economy will be impacted. There will need to be an orderly transition to any new regime. Especially as existing contractual arrangements between generators and transporters and processors and consumers will be affected. There will also be skips on building sites, and stockpiles at processing facility sites and on users' sites that may no longer be able to be collected, processed, or used. The fate of these stockpiles will need to be determined. We estimate an orderly transition will take twelve (12) months to mitigate impacts and ensure the continuation of critical waste services during transition. However, depending on the final agreed requirements the industry proposes a staged implementation over nine (9) months. Appendix C is an indicative timeline for the changes that will need to be implemented by industry operators, CEPs and laboratories. The EPA's proposed changes would require, at a minimum the following:

1. Waiving of the waste levy for recovered fines for a defined period (we suggest two years would be needed) to allow the waste generators, transporters, processors and consumers to adjust to the changes and increased costs;
2. Providing a subsidy to cover the tipping cost of recovered fines. Many building projects have sold 'off-the-plan' and are locked into waste management contracts for up to three (3) years; and
3. Financial support for the affected parties to transition out of the industry or towards a different business model. This could come potentially from any funding proposed to support the EPA's Waste Delivery Plan. As detailed by CIE in our October 2021 submission the industry transition costs are estimated at $270 million but we also note that government will receive an estimated $1,045 billion in increased revenue from the waste levy receipts.

The above requirements are not dissimilar to the MWOO/AWT transition package. This is reasonable given the similar impacts on the supply chains and consumers for both MWOO and Recovered Fines. Noting that the financial and economic costs of the loss of recovered fines as a product are much more significant especially if the major market, turf underlay is no longer available.

Conclusion

Notwithstanding the EPA's move away from revocation of the recovered fines orders and exemptions to the proposed changes in the drafts, many of the conclusions we made in our October 2021

submission remain. Further, the proposed changes have also raised new issues and concerns. In conclusion we make the following key points:

- The proposed changes to the recovered fines orders and exemptions, and the proposed new recovered soils order and exemption, are not reflective of current legislative and regulatory frameworks, industry performance and practices, scientific knowledge and expert opinion, and are without the justification required for such impactful regulatory change;
- The C&D waste resource recovery industry has worked in good faith at significant cost to improve performance and the products it supplies. We have also, at our own expense, engaged experts to review the EPA's proposals in the absence of it providing a cost/benefit analysis or regulatory impact statement;
- The proposed changes will have a negative and detrimental effect on recycling and resource recovery in NSW and will lead to increased landfilling and put added strain on landfill capacity; contrary to the government's stated objectives in the WaSMS and EPA's own *Waste Delivery Plan*.
- The National and NSW recycling and landfill avoidance targets will not be achieved and major initiatives like FOGO recycling will be seriously undermined;
- The changes will lead to increased costs and illegal dumping, especially as the construction sector increases activity and the C&D waste processing industry contracts because it is no longer commercially viable to recycle C&D waste material. It is likely that a small number of remaining facilities will struggle to service an increasing demand;
- It will be cheaper (and more profitable for some) to dump than dispose of waste to landfill. The proposed changes will undermine the gains made by RID Squads, Councils and EPA in tackling illegal dumping, and will in all likelihood result in increased movement of material to regional locations and interstate;
- A scientifically sound approach to managing asbestos that is reflective of the actual risks and mitigations must be developed in consultation with the waste and resource recovery industry;
- The proposed recovered soils order and exemption is not workable, and as a result there will be increased costs associated with the loss of substitute excavation materials and an increase in the extraction of virgin materials;
- There will be significant increases in costs to the waste industry, construction industry, householders, and a direct loss of jobs;
- We have provided reasonable, thoughtful, and viable alternatives to address the EPA's concerns and seek to enter into further discussions with the EPA about these; and,
- We share the same desired outcomes and want to continue the dialogue and seek genuine engagement to ensure the best possible outcomes for resource recovery, the environment, and human health.

Appendices

Appendix A – EnRiskS March 2022 advice

Appendix B – Industry, Recycling and Economic Impacts

Appendix C – Transition Timeline

Appendix D – Proposed Waste Classification and Resource Recovery framework

3 March 2022

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Waste Contractors and Recyclers Association
Waste management and Resource Recovery Association Australia

Attention: Tony Khoury, Gayle Sloan

RE: Draft Resource Recovery Orders and Exemptions for Recovered Fines and Recovered Soils

Environmental Risk Sciences Pty Ltd (enRiskS) is pleased to provide a proposal to WCRA and WMRR to provide advice regarding technical aspects of the draft resource recovery orders and exemptions for recovered fines and recovered soils recently issued for comment by NSW EPA.

Summary of findings

Recovery and reuse of materials from construction and demolition waste has been underway in NSW for about a decade under the resource recovery order/exemption system. NSW EPA administers this system.

In the last two years, the NSW EPA has been reviewing this system. In the second half of 2021, they proposed to revoke the orders and exemptions relevant to the recovered fines category and introduce a new category – recovered soils. Comment from industry was sought.

In February 2022, a new set of draft orders/exemptions were issued for comment by NSW EPA after considering the comments received in 2021.

This letter provides advice on technical issues related to these new draft orders. A range of issues have been identified.

- *Chemical parameters used to indicate that the materials are of appropriate quality for reuse* – the overall list of individual chemicals and groups of chemicals are similar to those required for contaminated land investigations, however, the list includes some difficult aspects:
    - organochlorine pesticides – the range of chemicals listed includes chemicals that are not normally assessed for contaminated land investigations and, for a number, would never be expected to be present in the materials used to produce recovered fines/soils.
    - chlorinated hydrocarbons – these chemicals are not normally assessed in soils due to their volatile characteristics and the limitations of the analytical methods.
    - physical contaminants – not the normal listing for these materials.
- *Analysis of these materials* – there are a number of aspects of the analytical requirements of these orders that are important to highlight:
    - Based on a survey of some of the major laboratories, the cost for the analysis of a single sample to meet the requirements of these orders would be in the range **$700-$1,100 per sample** (excluding GST). Once requirements are finalised and contracts could be negotiated, this cost is likely to decrease – perhaps to the lower end of this range.

- Standard turnaround time at the laboratory for this group of analyses will be 5 days so from the day processing was completed until the day a stockpile could be transported off the site would be 5 days. Once requirements are finalised and contracts can be negotiated with particular laboratories, the turn around time may be able to decrease but it is unlikely that it will be possible to achieve a 1 day turnaround time even if the increased cost was acceptable, given the large number of required analyses and the time they each take.
- There would need to be a suitable period for transitional arrangements. This would be a significant new source of samples for the laboratories. Clearly, they could work up to having adequate capacity (by buying new equipment and employing new staff) but this would make initial implementation of the orders difficult. It can take around 3 months for a complex piece of analytical equipment to arrive and be installed. It would also take some time to train new staff particularly for the asbestos and physical contaminants methods.
- A review of the specific analytical methods listed in these orders for each chemical or chemical group has identified a variety of matters that will make implementation difficult. These include, for one or more parameter:
  - Incorrect or out of date method numbers.
  - Method numbers that do not correspond to the method descriptions in the text.
  - Methods that are not currently used for a specific analysis in Australia – the methods that are currently used do not appear to be permissible as they are not listed.
  - Limits of reporting that are not achievable by the commercial laboratories.
  - Variations to standard methods which are not covered in the method, may impact on current work practices at the laboratory (impacts transitional arrangements), and may mean the laboratory is no longer NATA accredited for the varied method.

- *NATA accreditation* – NATA accreditation is provided on a method basis not a laboratory basis so each method to be used must have been assessed and accredited by NATA. If a laboratory does not have the appropriate method already covered in their accreditation it can take 6-12 months to obtain such accreditation. Almost 90% of the methods listed in the order require methods that are not currently standard approaches used by the laboratories. This may require changes to NATA accreditation for some laboratories. It is possible that some laboratories may decide not to take on this work because they do not want to change their normal procedures or to have 2 different sets of procedures for the same parameters running at the same time through their laboratories.
- *Limits of reporting/criteria* – for a number of parameters, the required maximum acceptable concentration that can be present in a sample is equal to or lower than the relevant laboratory limit of reporting listed with the analytical method or able to be provided by the laboratories. This means demonstrating compliance with the criteria will be difficult due to the impact of measurement error at these low/sensitive levels. This matter affects approximately half of the listed parameters.
- *Asbestos* – there are a range of aspects of the requirements for asbestos listed in the draft orders that may impact on the implementation:
  - Method listed in the orders includes a number of variations from the standard base method. These changes may impact on NATA accreditation and normal work practices in the laboratories. Such changes will impact on analytical costs and the time taken for each sample.
  - The standard base method indicates that if 5 fibres or less are identified using the trace aspect of this analysis then this should be identified as “no asbestos detected by polarised light microscopy including dispersion sampling”. This is because, given that asbestos fibres are naturally occurring and always present in the atmosphere including inside a laboratory, it

is not possible to be confident that 5 fibres or less were actually present in the original sample – contamination in the laboratory is quite possible.

- The method variation in these orders requires that, if even 1 fibre is observed using the trace aspect of this analysis, the laboratory must report that asbestos was observed for the purposes of demonstrating compliance.
- This appears to be in contradiction with the view of experts who were involved in writing the Australian Standard and the normal theoretical underpinnings of analytical chemistry.
- Some laboratories may not be comfortable with changing the way they report such results, should such results have the potential to be used in court.

- *Acid sulfate soils* – there are a number of aspects that are important to note:
  - Such soils are generally only present in coastal areas or in areas close to major waterways/wetlands so there should be no requirement to consider this aspect in areas that could not contain such materials.
  - It is a requirement of development applications in NSW that the presence or potential presence of acid sulfate soils must be documented. If such materials are present, then the proponent of a development must prepare an acid sulfate soils management plan and abide by that plan in managing such materials on-site or when they dispose of them.
  - Such plans could be required to include a statement that these materials not be supplied for processing into recovered soils or fines so that the responsibility is on the person generating the waste rather than those accepting material for reprocessing/resource recovery.
  - NSW EPA provides guidance on how to classify wastes containing acid sulfate soils in "Waste classification guidelines, Part 4: acid sulfate soils". This guidance places strict requirements on how such soils can be managed and/or disposed. It would appear to be unacceptable for such materials to be included in material for resource recovery.
  - If this requirement is to remain in the orders, it is noted that most acid sulfate soil assessments will take the form of checking NSW government maps to determine if a site is within an area where these materials may be present – this will require detailed knowledge of the source location for all materials prior to their arrival at the processing site.
  - Only materials from areas that have a high probability of such materials would require detailed laboratory analysis which would cost **$70-$130 per sample** (excluding GST). This cost is in addition to the analysis costs discussed above.
- *Stockpile sampling requirements* – the stockpile sampling requirements listed in these orders appear to be in line with commonly used stockpile sampling rates used in contaminated land and other relevant industries.
- *Laboratory sample management* – the laboratories will need to be able to store 5-10 tonnes of samples at any one time in addition to current requirements. They will also need to be able to dispose appropriately of around 5 tonnes per month. Costs to ensure this can happen will have to be passed onto the industry by the laboratories.

1 Background

This advice is building on from work undertaken by enRiskS in 2021. This work was outlined in a report:

- enRiskS (2021) Independent review: reuse of recovered fines in NSW – stage 1 (Dated 29 October 2021).

A submission was made by WCRA and WMRR to NSW EPA which included enRiskS (2021) as an attachment.

The NSW EPA has been reviewing the system for recovering resources from fines and soils that form part of building and demolition waste under the resource recovery system. The review has considered all the submissions that were provided in late October 2021.

Currently, the resource recovery system includes the following orders and exemptions:

- Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – The "continuous process" recovered fines order 2014 (NSW EPA 2014a)
- Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 – The "continuous process" recovered fines order 2014 (NSW EPA 2014b)
- Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – The "batch process" recovered fines order 2014 (NSW EPA 2014c)
- Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 – The "batch process" recovered fines order 2014 (NSW EPA 2014d).

The system does not include a separate order for recovered soils – this material is currently part of the recovered fines fraction, where relevant.

In February 2022, NSW EPA issued a number of documents including:

- NSW EPA (2022) The recovered soil order March 2022 (draft)
- NSW EPA (2022) The recovered soil exemption March 2022 (draft)
- NSW EPA (2022) The recovered fines order March 2022 (draft)
- NSW EPA (2022) The recovered fines exemption March 2022 (draft)
- Letter to industry from NSW EPA explaining the consultation process
- NSW EPA (2022) Recovered fines and soils information session – Q&A
- NSW EPA (2022) Consultation summary – recovered fines and recovered soil

The draft orders cover the sampling and testing requirements to manage the quality of the materials as well as notification and record keeping/recording requirements to ensure relevant information is kept by processors. The orders also include criteria for the chemical components of the recovered fines and soils and the test methods to be used to demonstrate that the material complies with the criteria. The exemptions indicate the limitations on how processed recovered fines and recovered soils can be reused.

Advice has been sought by the industry associations about some of the technical/scientific aspects of the draft orders/exemptions. This letter report has been prepared to provide that advice.

2 Objectives

Advice on the following matters will be addressed in this letter:

- appropriateness of the chemicals identified as requiring monitoring
- appropriateness of the criteria listed in Table 2 in each RRO
- issues in relation to the limits of reporting required by NSW EPA (proportion of the criteria as per Table 3)

- laboratory turnaround times for the full list of analytes
- availability of NATA accredited laboratories to do the work (including in relation to the test methods specified in Table 3 in each RRO)
- capacity of laboratories to take on a new source of large numbers of samples (transition)
- ballpark costs for undertaking the full suite of analyses
- timeframe for obtaining NATA accreditation if a laboratory is not currently accredited for a particular method
- issues with sample size – both for those doing the sampling and for the laboratories handling the samples, storing the samples and disposing of the samples
- issues in asbestos analysis
- issues in acid sulfate soils analysis
- issues in relation to PFAS
- issues in regard to stockpile sampling – number of samples used and where those statistics have been sourced
- issues relating to the limits being applied in the new orders about how and where these materials can be used and how that fits with the potential risks to people or the environment that could be posed by reuse of these materials.

3 Methodology and Scope of Works

The methodology adopted for this work is in accordance with the relevant National protocols/ guidelines including:

- ASC NEPM (1999 amended 2013) National Environmental Protection Measure – Assessment of Site Contamination including:
    - Schedule B1 Investigation Levels for Soil and Groundwater (NEPC 1999 amended 2013a)
    - Schedule B2 Guideline on site characterisation (NEPC 1999 amended 2013b)
    - Schedule B3 Guideline on laboratory analysis of potentially contaminated soils (NEPC 1999 amended 2013c)
- USEPA standard methods for analysis of wastes (SW-846) (https://www.epa.gov/hw-sw846/sw-846-compendium) and other methods where relevant.

4 NSW EPA Recovered soil order

The NSW EPA recovered soil order applies to excavated soil that has been mechanically sieved/screened to remove physical contaminants and construction/demolition waste. It must contain 98% natural materials by weight and must not contain acid sulfate soils. These materials can also be blended with virgin excavated natural materials (VENM) or compost, pasteurised garden organics or mulch as per the relevant resource recovery orders. The blended material is termed blended recovered soil.

There is a difference between recovered soil and excavated natural materials (i.e. ENM) – the processing of the materials by sieving/screening to remove other materials.

A processor of excavated soil to produce recovered soil must comply with a range of requirements to demonstrate that the material is of sufficient quality. These requirements include:

- Establish a sampling plan for works at the site.
- Be able to separate the processed material into batches or stockpiles that are no bigger than 2,000 tonnes and each batch/stockpile must be maintained separate from other batches/stockpiles once formed and sampled.
- Keep records about each batch of material and apply appropriate labels to stockpiles.

- Undertake an assessment of the recovered soil to assess the potential presence for acid sulfate soils.
- Collect samples (in accordance with Table 1 in the order) from each batch/stockpile to assess the presence of bonded asbestos containing materials (usually fibrous cement sheeting) – these samples need to be at least 10 L in size and are to be sieved through a 7 mm sieve in the field. If potential bonded ACM is found, then these pieces of fibrous cement sheeting need to be sent to a relevant laboratory to determine if the material actually contains asbestos. Records about each sample must be maintained.
- Collect samples (in accordance with Table 1 in the order) from each batch/stockpile to assess the rest of the parameters listed in Table 2 in the order which will require the samples to be provided to a relevant laboratory for analysis. Records about each sample must be maintained.
- The laboratories undertaking the analyses must be accredited by NATA to undertake the relevant methods.
- The batches/stockpiles must be kept on the premises until the results of the laboratory analyses are available and it has been shown that all parameters are in compliance with the order.
- If a batch/stockpile is shown to be non-compliant, it must not be supplied for the purposes relevant to the order and must be disposed of in a lawful fashion and the information about the batch/stockpile must be provided to the NSW EPA.
- Retesting of a batch/stockpile is not permitted except if the laboratory has indicated there was an error in the original analysis.
- If a batch/stockpile fails for one of the physical contaminants (i.e. 23-28), then the material can be rescreened to further remove physical contaminants. No other processing can occur. If rescreening occurs, then the batch/stockpile must be retested as per the original testing requirements.
- There are a range of requirements for segregating material from a batch/stockpile etc if non compliances are found.
- The processor must keep relevant records about all batches/stockpiles and must supply relevant information to each purchaser of recovered soil
- A processor must not blend recovered soil with the permissible material types unless the batch/stockpile of recovered soil complies with all requirements of the order (and the other material types comply with their orders)

The NSW EPA resource recovery exemption for recovered soils documents what uses are permitted for recovered soils. The draft exemption indicates that this material may only be applied to land as engineering fill (material that is required to support structures or associated pavements or for which engineering properties are to be controlled) or for use in earthworks (i.e. filling to achieve a required topography).

5 NSW EPA Recovered fines order

The NSW EPA recovered fines order applies to the excavated soil/fine material that is:

- less than 9.5 mm particle size
- derived from construction and demolition waste that has been mechanically sieved/screened to remove physical contaminants
- may include residues from mechanical sieving/screening of skip bin waste
- cannot include acid sulfate soils

These materials can also be blended to make blended recovered fines but only with virgin excavated natural materials (VENM).

A processor of excavated soil and fine material from skip bin waste who produces recovered fines must comply with a range of requirements to demonstrate that the material is of sufficient quality. These requirements include:

- Establish a sampling plan for works at the site.
- Be able to separate the processed material into batches or stockpiles that are no bigger than 2,000 tonnes and each batch/stockpile must be maintained separate from other batches/stockpiles once formed and sampled.
- Keep records about each batch of material and apply appropriate labels to stockpiles.
- Undertake an assessment of the recovered fines to assess the potential presence for acid sulfate soils.
- Collect samples (in accordance with Table 1 in the order) from each batch/stockpile to assess the presence of bonded asbestos containing materials (usually fibrous cement sheeting) – these samples need to be at least 10 L in size and are to be sieved through a 7 mm sieve in the field. If potential bonded ACM is found, then these pieces of fibrous cement sheeting need to be sent to a relevant laboratory to determine if the material actually contains asbestos. Records about each sample must be maintained.
- Collect samples (in accordance with Table 1 in the order) from each batch/stockpile to assess the rest of the parameters listed in Table 2 in the order which will require the samples to be provided to a relevant laboratory for analysis. Records about each sample must be maintained.
- The laboratories undertaking the analyses must be accredited by NATA to undertake the relevant methods.
- The batches/stockpiles must be kept on the premises until the results of the laboratory analyses are available and it has been shown that all parameters are in compliance with the order.
- If a batch/stockpile is shown to be non-compliant, it must not be supplied for the purposes relevant to the order and must be disposed of in a lawful fashion and the information about the batch/stockpile must be provided to the NSW EPA.
- Retesting of a batch/stockpile is not permitted except if the laboratory has indicated there was an error in the original analysis.
- If a batch/stockpile fails for one of the physical contaminants (i.e. 23-28), then the material can be rescreened to further remove physical contaminants. No other processing can occur. If rescreening occurs, then the batch/stockpile must be retested as per the original testing requirements.
- There are a range of requirements for segregating material from a batch/stockpile etc if non compliances are found.
- The processor must keep relevant records about all batches/stockpiles and must supply relevant information to each purchaser of recovered fines
- A processor must not blend recovered fines with VENM unless the batch/stockpile of recovered fines complies with all requirements of the order

The NSW EPA resource recovery exemption for recovered fines documents what uses are permitted for recovered fines. The draft exemption indicates that this material may only be applied to land for use in earthworks (i.e. filling to achieve a required topography).

6 Criteria governing quality of these materials

The quality of any recovered soil or recovered fines is to be demonstrated by showing compliance with the criteria listed in **Table 1**.

Table 1: Criteria for chemical and physical parameters for recovered soil and recovered fines

Parameter	NSW EPA recovered soil order		NSW EPA recovered fines order	
	Maximum average concentration/value	Absolute maximum concentration/value	Maximum average concentration/value	Absolute maximum concentration/value
1. Mercury	0.5 mg/kg	1 mg/kg	0.5 mg/kg	1.5 mg/kg
2. Cadmium	0.5 mg/kg	1 mg/kg	0.5 mg/kg	1 mg/kg
3. Lead	75 mg/kg	150 mg/kg	100 mg/kg	250 mg/kg
4. Arsenic	20 mg/kg	40 mg/kg	20 mg/kg	40 mg/kg
5. Chromium (total)	75 mg/kg	150 mg/kg	75 mg/kg	150 mg/kg
6. Copper	100 mg/kg	250 mg/kg	100 mg/kg	250 mg/kg
7. Nickel	40 mg/kg	80 mg/kg	50 mg/kg	100 mg/kg
8. Zinc	150 mg/kg	450 mg/kg	250 mg/kg	600 mg/kg
9. Electrical Conductivity	2.5 dS/cm	3.5 dS/cm	2.5 dS/cm	3.5 dS/cm
10. pH	5-9	4.5-10	5-9	4.5-10
11. Total Polycyclic Aromatic Hydrocarbons ('PAHs')	20 mg/kg	50 mg/kg	20 mg/kg	80 mg/kg
12. Benzo(a)pyrene TEQ	1 mg/kg	3 mg/kg	2 mg/kg	4 mg/kg
13. Naphthalene	1 mg/kg	2 mg/kg	1 mg/kg	3 mg/kg
14. Benzene	Not applicable	0.5 mg/kg	Not applicable	0.5 mg/kg
15. Toluene	Not applicable	65 mg/kg	Not applicable	65 mg/kg
16. Ethylbenzene	Not applicable	25 mg/kg	Not applicable	25 mg/kg
17. Xylenes	Not applicable	15 mg/kg	Not applicable	15 mg/kg
18. Total Recoverable Hydrocarbons (TRH) F1	Not applicable	30 mg/kg	Not applicable	40 mg/kg
19. TRH F2	Not applicable	80 mg/kg	Not applicable	100 mg/kg
20. TRH F3 (>C16 - C34)	Not applicable	150 mg/kg	Not applicable	250 mg/kg
21. TRH F4 (>C34 - C40)	Not applicable	450 mg/kg	Not applicable	600 mg/kg
22. Asbestos fines/ fibrous asbestos	Not applicable	No asbestos found	Not applicable	No asbestos found
23. Paper and cardboard, asphalt, cloth, paint, rubber	0.05%	0.1%	0.05%	0.1%
24. Hard plastic	Not applicable	0.1%	Not applicable	0.1%
25. Light plastic	Not applicable	0.01%	Not applicable	0.01%
26. Glass	0.05%	0.1%	0.05%	0.1%
27. Metal	0.05%	0.1%	0.05%	0.1%
28. Wood	0.05%	0.1%	0.05%	0.1%
29. Polychlorinated bi-phenyls ('PCBs')	Not applicable	0.2 mg/kg	Not applicable	0.2 mg/kg
30. Individual organochlorine pesticides ('OCPs')	Not applicable	0.1 mg/kg	Not applicable	0.1 mg/kg
31. Per- and polyfluoroalkyl substances ('PFAS')	Not applicable	0.005 mg/kg	Not applicable	0.005 mg/kg
32. Chlorinated hydrocarbons	Not applicable	0.1 mg/kg	Not applicable	0.1 mg/kg

7 Relevance of parameters

Consideration of the relevance of evaluating these parameters has been undertaken by looking at the following matters:

- whether a chemical or group of chemicals are known to commonly be present in areas where materials used in these products are sourced from
- whether a chemical or group of chemicals is included in the National Environment Protection (Assessment of Site Contamination) Measure (i.e. ASC NEPM) as being chemicals that are known to have potential to be present in soils across Australia and, of sufficient concern, that they need to be assessed and managed, if present above guideline levels
- whether a chemical or group of chemicals is currently in use in Australia or are known to be persistent enough in the environment such that they could still remain present from historical uses
- whether a chemical or group of chemicals was ever used in Australia.

Table 2 provides a summary of these matters for each chemical or group of chemicals.

Table 2: Relevance of the listed chemical and physical parameters

Parameter	Comments
1. Mercury	It is common to require soils, waste materials and waters to be analysed for metals. These are chemicals that are naturally occurring and are commonly present in most environmental samples. This subset of metals is commonly used. This grouping is the common list usually measured in contaminated land investigations. It is important to ensure the levels of these metals are appropriately controlled. These parameters are included in the requirements under the current orders.
2. Cadmium	
3. Lead	
4. Arsenic	
5. Chromium (total)	
6. Copper	
7. Nickel	
8. Zinc	
9. Electrical Conductivity	Understanding the pH and conductivity of soil or fines is important in determining that the materials are appropriate for use. These are common parameters to assess. These parameters are included in the requirements under the current orders.
10. pH	
11. Total Polycyclic Aromatic Hydrocarbons ('PAHs') – sum of following compounds	Polycyclic aromatic hydrocarbons (PAHs) are naturally occurring chemicals that are produced during burning/combustion. They are widespread through the environment due to bushfires, fires in general, vehicle emissions etc etc. They are also present in asphalt (i.e. mix of sand, aggregate and bitumen) and bitumen (i.e. the sticky binding material). They can also be present in soils due to coal tar at gasworks sites or in coal. It is also important to note that ash from power stations was commonly used in inner city Sydney in the early 1900s to fill sites prior to construction. These chemicals are present in such ash but not in a form that is readily available for uptake into people or other organisms. This means actual exposure is quite limited and guidelines based on 100% uptake overestimate potential risks. This grouping is the common list usually measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled. These parameters are included in the requirements under the current orders.
Naphthalene	
Anthracene	
Benzo[k]fluoranthene	
Acenaphthylene	
Fluoranthene	
Benzo[a]pyrene	
Acenaphthene	
Pyrene	
Dibenz[a,h]anthracene	
Fluorene	
Benzo[a]anthracene	
Benzo[g,h,i]perylene	
Phenanthrene	
Chrysene	
Indeno[1,2,3-c,d]pyrene	
Benzo[b]fluoranthene	
# 12. Benzo(a)pyrene TEQ – determined by summing the concentrations of these compounds multiplied by the relevant equivalence factor (as shown)	Polycyclic aromatic hydrocarbons are naturally occurring chemicals that are produced during burning/combustion. They are widespread through the environment due to bushfires, fires in general, vehicle emissions etc etc. They are also present in asphalt (i.e. mix of sand, aggregate and bitumen) and bitumen (i.e. the sticky binding material). They can also be present in soils due to coal tar at gasworks sites or in coal.

Parameter	Comments
Benzo[k]fluoranthene x 0.1	Benzo[a]pyrene TEQs are a subset of the more problematic PAHs. This grouping is the common list usually measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled. The current orders include benzo[a]pyrene alone as a separate parameter. The draft orders require benzo[a]pyrene TEQs which is a variation but this variation is in line with other national guidance.
Benzo[a]pyrene x 1	
Dibenz[a,h]anthracene x 1	
Benzo[a]anthracene x 0.1	
Benzo[g,h,i]perylene x 0.01	
Chrysene x 0.01	
Indeno[1,2,3-c,d]pyrene x 0.1	
Benzo[b]fluoranthene x 0.1	
# 13. Naphthalene	Naphthalene is the smallest of the common PAHs. It is also present in fuels, particularly diesel. This chemical is usually measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled. This chemical was not included as a separate item under the current orders, however, naphthalene would have been analysed by the laboratories as it is part of total polycyclic aromatic hydrocarbons.
# 14. Benzene	This group of chemicals consists of the most important chemicals that can be present in soil where fuels have been spilled or leaked – particularly petrol. They are commonly found at service stations and fuel depots. They are widespread in the environment and are naturally occurring. This grouping is usually measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled. These chemicals are a NEW addition to the orders. They are not included on the current orders.
# 15. Toluene	
# 16. Ethylbenzene	
# 17. Xylenes	
18. Total Recoverable Hydrocarbons (TRH) F1	Total recoverable hydrocarbons (various fractions) are chemicals grouped by size that are present in the environment and contain carbon and hydrogen atoms. They are primarily designed to check for contamination from fuels (petrol, diesel) as well as oils and tars. However, the analysis picks up any chemicals that have carbon and hydrogen in them so it can pick up degrading vegetation, peat, manure etc as well as other contaminants containing carbon and hydrogen like chlorinated hydrocarbons. This grouping is usually measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled. These groupings for TRH are different to those listed on the current orders due to a change in national guidance, however, analysis of petroleum hydrocarbons is a requirement of the existing orders as well as these draft orders.
19. TRH F2	
20. TRH F3 (>C16 - C34)	
21. TRH F4 (>C34 - C40)	
#22. Asbestos fines/ fibrous asbestos	Commonly measured in contaminated land investigations. There are national health based guidelines which take account of toxicological information and the practicalities of analysis for fibres. It is noted that asbestos is naturally occurring in soil and is widely distributed in air in urban areas. Analysis of asbestos is not a requirement of the existing orders. This is a NEW requirement.
23. Paper and cardboard, asphalt, cloth, paint, rubber	These physical contaminants could be unsightly when recovered fines or recovered soils are applied at the surface. If the soils or fines are placed at depth, then the aesthetic issues are no longer relevant. It is noted that the size of these materials must be between 2.36 mm and 9.5 mm, given the
24. Hard plastic	

Parameter	Comments
25. Light plastic 26. Glass 27. Metal 28. Wood	processing of the materials overall (i.e. <9.5 mm) and the nature of the analysis for physical contaminants (i.e. >2.36 mm). These are small pieces these materials. For most of these contaminants, risks to human health or ecosystems are very low – e.g. metal, glass or wood, paper etc. These are not required to be assessed in soil during contaminated land investigations.
# 29. Polychlorinated biphenyls ('PCBs') as listed below Arochlor 1016 Arochlor 1221 Arochlor 1232 Arochlor 1242 Arochlor 1254 Arochlor 1260	Polychlorinated biphenyls were chemical mixes that were used in electrical equipment. They are persistent chemicals and so they were widespread in the environment due to these uses. The use of these oils was banned in 1986 but it took some time for their use in existing equipment to be phased out as some of the equipment is long lived. All uses in existing equipment and all treatment of such materials was scheduled to be completed during the 2000s. While low levels of these chemicals may be present in urban areas, it is not common to find significant levels unless dealing with soil from a substation or power station etc. PCBs are listed in the ASC NEPM and so analysis using this approach is common in contaminated land investigations. It is noted that, where a PCB source is known to be present at such a site (e.g. substation), analysis for dioxin-like chemicals is required instead of the approach using Arochlors. Analysis for PCBs is not a requirement of the existing orders. This is a NEW requirement.
# 30. Individual organochlorine pesticides ('OCPs') as listed below	Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Aldrin/dieldrin	These 2 pesticides were used in Australia. They were used to control termites around buildings and for controlling a range of other insects. They were banned from use in 1987-88. Aldrin initially breaks down in the environment to dieldrin, so these chemicals are commonly considered together. It is possible that dieldrin could be present in construction and demolition wastes or excavated soil from urban areas. No aldrin should be present as this would indicate recent use and that is illegal. These are very persistent chemicals and are included on the Stockholm Convention. These chemicals are measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled should they be present. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Chlordane	Chlordane was used in Australia as an insecticide including for termite treatments. It was banned from use in the late 1980s. These chemicals are measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled should they be present. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
DDT/DDD/DDE	These pesticides were used in Australia. They were used to control termites around buildings and for controlling a range of other insects. They were banned from use in 1987. The presence of DDD or DDE indicates historical use but if DDT itself was present this is likely to indicate recent use which is illegal. It is normal for the chemical analysis to measure the whole group. These are very persistent chemicals and are included on the Stockholm Convention.

Parameter	Comments
	These chemicals are measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled should they be present. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Endosulfan	Endosulfan was a common insecticide used in agriculture in Australia – the cotton industry, in particular. It was banned from use in Australia in 2010. The chemicals in endosulfan are usually described as endosulfan I (or alpha endosulfan), endosulfan II (beta endosulfan) and endosulfan sulfate. The sulfate is the first breakdown product, while I and II are normally present together in the technical material as they are isomers (mirror images). It is not clear which one of these is being referred to here – the group or one of them specifically. In the ASC NEPM, Schedule B3 indicates that the term endosulfan refers to the sum of alpha, beta and sulfate which makes sense as all have similar toxicity. This pesticide was not likely to have been widely used in urban areas. These chemicals are measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled should they be present. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Endrin	Endrin was used in Australia but not to the same extent as some of the other termite treatments. It was banned from use in the late 1980s. Endrin aldehyde is the first breakdown product and both of these are commonly measured to assess risks. These chemicals are measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled should they be present. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Endrin aldehyde	
Heptachlor	Heptachlor was commonly used in Australia to control termites around buildings and for controlling a range of other insects. It was banned from use in 1995/96. Heptachlor epoxide is the first breakdown product and both heptachlor and heptachlor epoxide are commonly measured to assess risks. These chemicals are measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled should they be present. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Heptachlor epoxide	
Hexachlorobenzene	This chemical was manufactured at the Orica Botany site. Given that this chemical is listed on the Stockholm Convention, Australia developed a national management plan for this chemical in the 1990s which was specifically directed to the management of the wastes containing this chemical that were present at that site. This chemical can also be present in some pesticides. This was not a pesticide that was widely used in urban areas. It is no longer registered for use in Australia.

Parameter	Comments
	This chemical is listed in the ASC NEPM and is measured in contaminated land investigations. It is important to ensure the levels are appropriately controlled should they be present. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Hexachlorophene	This chemical is an organochlorine but it was not used as a pesticide. It is actually used as a topical antiseptic (component of phisohex which can be purchased at a pharmacy). The Therapeutics Goods Administration looks after the regulation of this chemical. In 2016, they issued their latest update. They noted that there were no known industrial uses, imports or manufacturing for this chemical in Australia. They did note that it is present at low levels in some medicinal cleansing lotions (like phisohex) and that such uses are controlled by the Scheduling of this chemical on the poisons schedules. Given its uses, it is possible that this chemical will be present in sewage, but it is not likely it will be present in soils or construction/demolition wastes to any great extent. This chemical is not included on the ASC NEPM, so it is not a normal part of contaminated land investigations. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Isodrin	Isodrin is another name for aldrin and/or an isomer of aldrin. It was present in aldrin as a manufacturing by-product. It is not clear why it has been separately listed here as it would be covered by the aldrin/dieldrin part of the analysis. This chemical is not included on the ASC NEPM, so it is not a normal part of contaminated land investigations. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Methoxychlor	Methoxychlor is a pesticide that was used to control a range of insect pests in agriculture. It was banned from use in Australia in 1987. It may have had limited uses in Australia, but may have included a dog shampoo. It is unlikely to be present in urban areas to any significant extent given the time since it was banned and likely use patterns focused on agricultural areas. Methoxychlor is included in the ASC NEPM so it may be measured in soil during some contaminated land investigations although if there is sufficient understanding about the history of a site, it is a chemical where justification would normally be provided that analysis was not necessary. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Mirex	Mirex is a chemical that was primarily used in Australia for control of giant termites in the Northern Territory. It has not been commonly used in urban areas. While it is listed on the Stockholm Convention, Australia did have an exemption for a small level of use in the Northern Territory for this purpose until recently. It is not likely to have been used in NSW to any significant extent. Mirex is included in the ASC NEPM so it may be measured in soil during some contaminated land investigations although if there is sufficient understanding about the history of a site, it is a chemical where justification would normally be provided that analysis was not necessary. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.

Parameter	Comments
Pentachloronitrobenzene	Pentachloronitrobenzene is the active ingredient of a pesticide called quintozene. This is still registered for use in Australia. It is a fungicide (i.e. controls fungal pests), so these products are used for treatment of turf or as seed dressing. Neither of these use patterns, are likely to result in this chemical being widespread in the environment so it is unlikely to be present in recovered soil or fines. This chemical is not listed in the ASC NEPM, so it is not assessed during contaminated land investigations. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Pentachlorophenol	Pentachlorophenol was used in treating timber. It is not currently approved for any uses as a pesticide in Australia. It may be present in areas where timber treated with this chemical has been stored or where the actual treatment process occurred but is unlikely to be present to any significant extent where timber treated with this chemical was used. Timber treated with this chemical was not commonly used around homes. The NSW EPA notes that pentachlorophenol treated timber was not commonly used in NSW for power poles or bridge timbers. It is included in the ASC NEPM so it may be measured in soil during contaminated land investigations. If there is sufficient understanding about the history of a site, it is a chemical where justification would normally be provided that analysis was not necessary. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
2,4,5-T	This chemical is a herbicide which has not been permitted for use in Australia since the late 1980s. It was one of the herbicides used in Agent Orange. It is not a particularly persistent chemical and is not expected to last from one growing season to the next in agricultural situations. This means, given that it has been at least 30 years since it was available to be used in Australia and its half life in soil ranges from 14 days to 300 days, it is not clear why this chemical is included on a list of pesticides to be analysed in materials arising from excavated soils from urban areas or from construction and demolition wastes. This chemical will not be present in these materials due to historical uses due to degradation and it would be illegal for it to be present due to recent uses. It is not clear why it needs to be monitored. Other phenoxy herbicides are still permitted to be used in Australia including 2,4-D, MCPA, MCPB etc, however, they are not included in the orders. It would be more likely that these could be found in recovered soil or fines than for 2,4,5-T to be found, however, these chemicals are primarily used in agricultural areas, so it is also unlikely they will be found in the soils/fines covered by these orders. The ASC NEPM includes guidelines for 2,4,5-T, 2,4-D, MCPA, MCPB etc so it is possible that 2,4,5-T is measured in soils during some contaminated land investigations, however, if there is sufficient information about the history of a site supporting that this group of pesticides would not have been used at a site, it is unlikely that it is measured. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
Toxaphene	It is not particularly clear whether toxaphene was used extensively in Australia. It was definitely used extensively in other countries including the US. It may have been used in some cotton growing areas (Ord River, Northern WA) in the 1960s and 70s. It was not a pesticide used for termite control in urban areas. It is complex to analyse (as it is made up of a number of chemicals). It is highly unlikely to be present in the materials covered by these orders.

Parameter	Comments
	Toxaphene is included in the ASC NEPM so it may be measured in soil during some contaminated land investigations although if there is sufficient understanding about the history of a site it is a chemical where justification would normally be provided that analysis was not necessary. Analysis for organochlorine pesticides (and the other chemicals listed here) is not a requirement of the existing orders. This is a NEW requirement.
# 31. Per- and polyfluoroalkyl substances ('PFAS') as listed below	These chemicals can be present in the environment due to their widespread use in products like food packaging, waterproof clothing, kitchenware, fire fighting foams and others. These chemicals are covered by a National Environmental Management Plan (rather than the ASC NEPM). These are normally covered in many contaminated land investigations. Analysis for PFAS is not a requirement of the existing orders. This is a NEW requirement.
PFOS+PFHxS	
PFOA	
# 32. Chlorinated hydrocarbons as listed below	These chemicals are present in the environment due to their use in drycleaning (PCE) and as degreasers (TCE and PCE) (vehicle repair, vehicle manufacture or various manufacturing). They are also present because they are the breakdown products – i.e. PCE is used in drycleaning and it breaks down to TCE followed by DCE (primarily cis) and then vinyl chloride. These chemicals are listed in the ASC NEPM, however, they are not assessed in soil. This is because they are too volatile to be reliably sampled in soil and because laboratories cannot reliably reach the limits of reporting that would be necessary to check for risks due to vapour intrusion into buildings. In contaminated land investigations, these chemicals are assessed using soil vapour measurements. These are not relevant for recovered fines or soils Given the sources of the materials used to make recovered fines or recovered soils, the processing of these materials using shaking/sieving, the storing of these materials in stockpiles and the nature of these chemicals, it is highly unlikely these chemicals could ever be present in these materials. These chemicals are extremely volatile and would evaporate from the materials during processing and storage if they could ever be in the materials accepted for processing. Analysis for chlorinated hydrocarbons is not a requirement of the existing orders. This is a NEW requirement.
Trichloroethene (TCE)	
Tetrachloroethene (PCE)	
cis-1,2-Dichloroethene (cis-DCE)	
trans-1,2-Dichloroethene (trans-DCE)	
Vinyl chloride	
# 33. Asbestos – bonded ACM	Commonly measured in contaminated land investigations. There are national health based guidelines which take account of toxicological information and the practicalities of analysis for fibres. It is noted that asbestos is naturally occurring in soil and is widely distributed in air in urban areas. Analysis for bonded ACM is not a requirement of the existing orders. This is a NEW requirement.

Notes:

Rows are shaded/not shaded just to indicate the different groupings of chemicals to make the table easier to read

chemicals or groupings of chemicals that were not listed in the previous resource recovery orders

These parameters and parameter groups are generally in compliance with the types of chemicals investigated under the ASC NEPM and other national guidance documents.

There are some specific individual chemicals listed in some of the groups, particularly the organochlorine pesticides group which includes chemicals that are not pesticides, not organochlorine based chemicals, have never been used in Australia to any significant extent or have not been used for so long that they could no longer be present). The inclusion of these chemicals is unusual and some of them are extremely difficult to analyse. It is not clear why it is important that these chemicals be measured.

Another group that is problematic is the chlorinated hydrocarbons. These chemicals are extremely volatile and so it is highly unlikely that they will ever be detected in these materials, given that these materials are stockpiled, sieved etc – all of which allows/encourages these chemicals to evaporate. The only time it would be likely for these chemicals to be present above the limits of reporting would be if the original waste material was significantly contaminated. Given the processes for controlling where the original waste comes from, it is not possible for such material to be included in waste being processed for use in recovered soils or fines. The analysis of these chemicals in soil samples is not required under the ASC NEPM for this reason.

8 Test methods

There are a range of issues that will limit the practicality of this order in regard to the methods listed in Table 3 of the resource recovery orders for recovered soil and recovered fines.

Before discussing the detailed issues in regard to the analytical methods, there are a number of more general practical issues that will impact on implementation of these orders including:

- Analytical costs – based on a brief survey of a number of the major laboratories, the cost for the analysis of a single sample to meet the requirements of these orders would be in the range **$700-$1,100 per sample** (excluding GST).
- It is normally possible to negotiate a lower price with a particular laboratory for multiple samples per batch and ongoing supply of batches of samples, but this would be something that would be done only once standard procedures and ongoing contracts have been developed.
- Standard turnaround time for this group of analyses is 5 days.
- There are additional fees for shorter turnaround times:
    - 50% extra for 24 hour turnaround time (i.e. $1,050-$1,650 per sample excluding GST).
        - It is unlikely that the full set of analyses listed in the NSW EPA draft orders could be undertaken in a single 24 hour period – in particular, the physical contaminants analysis requires that the 6 kg sample be dried before being analysed.
        - Most labs would only agree to attempting a 24 hour turnaround if they had capacity in their laboratory on that day. If they do not have capacity, they do not offer 24 hour turnaround option.
        - A 24 hour turnaround time would not be something a laboratory would agree to all day every day.
        - For a 24 hour turnaround time, it should be noted that this does not allow any time for the laboratory to address any issues that arise during a day – e.g. equipment breakdown etc.
    - 25% extra for 48 hour turnaround time (i.e. $875-$1,375 per sample excluding GST).
    - 10% extra for 72 hour turnaround time (i.e. $770-$1,210 per sample excluding GST).
- The number of samples per week for the industry overall would be in the order of 500 depending on what size batch or stockpile each site works with.

- This would be a significant new source of samples for the laboratories.
- Clearly, they could work up to having adequate capacity (by buying new equipment and employing new staff) but this would make initial implementation of the orders difficult.
- It can take around 3 months for a complex piece of analytical equipment to arrive and be installed.
- It would also take some time to train new staff particularly for the asbestos and physical contaminants methods.
- NATA accreditation is provided on a method basis not a laboratory basis so each method to be used must have been assessed and accredited by NATA. If a laboratory does not have the appropriate method already covered in their accreditation, it can take 6-12 months to obtain such accreditation.

Table 3 discusses the detailed issues with the methods chosen for the orders. A separate discussion of asbestos analysis is provided following **Table 3**.

Table 3: Test methods for each parameter

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
1. Mercury	USEPA SW-846 7471B	Available	USEPA SW-846 7471B	Available	<0.2 mg/kg	Available	Yes
2. Cadmium	USEPA SW-846 3051A	Microwave assisted digestion is not the method commonly used by the large commercial laboratories. The laboratories use a different USEPA approach using hot block digestion – USEPA SW-846 3050B. This means that samples provided to these laboratories would not be analysed in accordance with the order although they would be analysed in accordance with the laboratories NATA accreditation and in accordance with Schedule B3 in the ASC NEPM	USEPA SW-846 6010D	Available	10% of AMC – 0.1 mg/kg	Available	The major laboratories are accredited by NATA for their standard approaches for these analyses. They may not be accredited for the specific methods listed in this order.
3. Lead					10% of AMC – 15 mg/kg		
4. Arsenic					10% of AMC – 4 mg/kg		
5. Chromium (total)					10% of AMC – 15 mg/kg		
6. Copper					10% of AMC – 25 mg/kg		
7. Nickel					10% of AMC – 8 mg/kg		
8. Zinc					10% of AMC – 45 mg/kg		
9. Electrical Conductivity	Mix 1 part recovered soil with 5 parts distilled water	Available	Method outlined in Section 6.3 Schedule B3 ASC NEPM	Available	0.001 dS/cm	Commonly used units for conductivity are µS/cm. Schedule B3 method requires reporting in dS/m.	Yes

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
						The units listed here are a combination of the 2 and are unusual. This has the potential to lead to confusion and transcription errors. Laboratories can achieve this LOR	
10. pH	Mix 1 part recovered soil with 5 parts distilled water	Available	Method outlined in Section 6.2 Schedule B3 ASC NEPM	Available	0.1 pH unit	Available	Yes
11. Total Polycyclic Aromatic Hydrocarbons ('PAHs') – sum of following compounds	USEPA SW-846 3540 or 3550	3540 is the Soxhlet extraction method (i.e. solvent extraction as described in the order) – the correct USEPA method reference is 3540C 3550 is the ultrasonic extraction method. – The correct USEPA method reference is 3550C. It is important to note that the text in the testing requirements table does not indicate that	USEPA SW-846 8100	Available	0.1 mg/kg for each individual compound	Available	The major laboratories are accredited by NATA for their standard approaches for these analyses. They may not be accredited for the specific methods listed in this order.
Naphthalene							
Anthracene							
Benzo[k]fluoranthene							
Acenaphthylene							
Fluoranthene							

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
Benzo[a]pyrene		ultrasonic extraction is permitted. 3561 is the relevant method number for extraction using supercritical fluid for PAHs. The use of this approach is specified in the text of the relevant section of the order even if the relevant method number is not listed. The Soxhlet extraction method requires solvent extraction for 16-24 hours with very bulky equipment which limits how many samples can be done at once. This is not the way the major laboratories undertake such extraction and would cost significantly more than the standard approaches that are normally used if this method is to be enforced.					
Acenaphthene							
Pyrene							
Dibenz[a,h]anthracene							
Fluorene							
Benzo[a]anthracene							
Benzo[g,h,i]perylene							
Phenanthrene							
Chrysene							
Indeno[1,2,3-c,d]pyrene							
Benzo[b]fluoranthene							

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
		Solvent extraction can be undertaken using different approaches. Looking at Schedule B3 of the ASC NEPM (Sections 10.2.3/10.2.4) another option listed is end over end tumbling with solvent – described by CRC CARE Technical Working Group. It would be useful to get major laboratory advice on what they actually do.					
12. Benzo(a)pyrene TEQ – determined by summing the concentrations of these compounds multiplied by the relevant equivalence factor (as shown)	Same as above	Same as above	Same as above	Same as above	0.3 mg/kg	Assuming that the LOR for each individual compound is 0.1 mg/kg and calculating the TEQs at the LOR gives a value of 0.242 mg/kg so an LOR of 0.3 mg/kg for the TEQ value should be achievable by the laboratories	Same as above
Benzo[k]fluoranthene x 0.1							
Benzo[a]pyrene x 1							
Dibenz[a,h]anthracene x 1							
Benzo[a]anthracene x 0.1							
Benzo[g,h,i]perylene x 0.01							
Chrysene x 0.01							
Indeno[1,2,3-c,d]pyrene x 0.1							
Benzo[b]fluoranthene x 0.1							
13. Naphthalene	Same as above	Same as above	Same as above	Same as above	0.1 mg/kg	Available	Same as above

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
14. Benzene	USEPA SW-846 5035 or 5030B	Method 5035 is a purge and trap method for extraction of volatile organics from soil and waste samples. Method 5030B is a purge and trap method for extraction of volatile organics from water samples. There is a part of 5030B that is relevant for solid samples where high levels or oily materials are present in a sample. That part should be applied to the sample once the extraction process in 5035 has been applied. This means the sample preparation requirements should indicate that the method to be used is	USEPA SW-846 8260B	USEPA SW-846 8260B does not actually exist any longer. The USEPA guidance has now updated this method a couple of times. The appropriate method reference is now 8260D for analysis of these compounds by GCMS.	0.1 mg/kg	Available	The laboratories will be NATA accredited for the appropriate methods as these are compounds they analyse regularly in soils and wastes. However, they may not be accredited for the methods as listed in this order as their methods would no longer refer to 8260B.
15. Toluene					0.1 mg/kg		
16. Ethylbenzene					0.1 mg/kg		

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
17. Xylenes		USEPA SW-846 5035 with the addition of the relevant sections of 5030B when necessary/appropriate. It is noted that this was not made clear in Schedule B3 of the ASC NEPM either.			0.3 mg/kg		
18. Total Recoverable Hydrocarbons (TRH) F1	USEPA SW-846 5035	Available	Method A1 in Section 13.2 Schedule B3 ASC NEPM	Available	25 mg/kg	Available – common LOR for F1 in soil is 10 mg/kg	Yes
19. TRH F2	USEPA SW-846 3540C, 3545A or 3550C	None of these methods are as specified for sample preparation in the ASC NEPM method. That method indicates solvent extraction with end over end shaking for 1 hour.	Method A2 in Section 13.2 Schedule B3 ASC NEPM	Available	25 mg/kg for F2 100 mg/kg for F3 and 120 mg/kg for F4	Available for F3 and F4 Common LOR for F2 in soil is 50 mg/kg Common LOR for F3 is 100 mg/kg Common LOR for F4 is 100 mg/kg	The major laboratories are accredited by NATA for their standard approaches for these analyses. They may not be accredited for the specific

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
20. TRH F3 (>C16 - C34)		3540C is the method for Soxhlet extraction, 3545A is the method for pressurised fluid extraction and 3550C is the method for ultrasonic extraction. Given that analysis of these fractions is a common analysis as required in the ASC NEPM and it would be usual to undertake it in accordance with the ASC NEPM, requiring different sample preparation methods probably means the labs will not be NATA accredited for any of these specified USEPA methods.					methods listed in this order.
21. TRH F4 (>C34 - C40)							
23. Paper and cardboard, asphalt, cloth, paint, rubber	NSW Roads and Traffic Authority Test Method T276 Foreign Materials Content of Recycled Crushed Concrete.	This method involves sieving at least 6 kg of sample once the sample has been dried. Then a person (the analyst) picks through the material collected on the sieve to find materials other than concrete (as per original method purpose) – i.e. physical contaminants. Once physical contaminants have been collected on the sieve, the RTA method requires them to be divided into 3 groups – type I – metal, glass, asphalt, stone, ceramics, slag type II – plaster, clay lumps and other friable material type III – rubber, plastic, bitumen, paper, cloth, paint, wood and other vegetable matter.			0.1% for most groupings 0.01% for light plastics	Available. The RTA method notes an LOR of 0.1% for all 3 of the original groupings. This means the labs can measure at least 6 g of material from the original 6 kg	The major laboratories are accredited by NATA for their standard approaches for this method. They may not be accredited for the various adjustments to
24. Hard plastic							

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
25. Light plastic		It is presumed that these 3 groups were developed by grouping materials that look alike or that are difficult to differentiate in recycled crushed concrete. The RTA method is designed for application to recycled crushed concrete and requires the use of a 4.75 mm sieve. These orders list the use of a 2.36 mm sieve and are adopting this method for use on recovered soils and recovered fines. This means that these orders are asking for the method to be undertaken in a way that is not in accordance with the specified method, but this is not acknowledged. Methods can be adapted but this should be acknowledged. Such adaptations usually require some level of validation to show they are still relevant for the new approach. Given the methodology here, a validation step may not be required although checking that analysts are classifying materials correctly and reliably into the various groupings given the changes would be needed. All of these changes mean the laboratories will have to reorganise the way they do the analysis – i.e. retraining staff, changing their LIMS and validating their analysts using the new classifications. They will also probably have to seek reaccreditation by NATA.				sample with appropriate measurement error. To reach an LOR of 0.01%, they need to be able to measure 0.6 g in 6 kg with sufficient precision etc to reach the appropriate measurement error. This may need some adjustment of procedures etc.	the method listed in this order.
26. Glass							
27. Metal							
28. Wood							
29. Polychlorinated biphenyls ('PCBs') as listed below	USEPA SW-846 3540C or 3550C	As noted above, method 3540C is the Soxhlet extraction method. This method requires solvent extraction for 16-24 hours with very bulky equipment which limits	USEPA SW-846 8081B, 8082A or 8270D	Method 8082A is the only method of the ones listed that should be used for PCBs according to guidance within the method statements.	0.2 mg/kg for each grouping	Available	Yes
Arochlor 1016							

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
Arochlor 1221		how many samples can be done at once. This is not the way the major laboratories undertake such extraction and would cost significantly more than the standard approaches that are normally used if this method is to be enforced. The alternate method listed is ultrasonic extraction. The main laboratories are likely to use that method. The laboratories may also use supercritical fluid extraction as per USEPA SW-846 3562.		Method 8081B is for the analysis of organochlorine pesticides specifically. The correct method reference for 8270 is 8270E not D. Method 8270E covers an extensive list of semi-volatile organics but does not strictly cover PCBs.			
Arochlor 1232							
Arochlor 1242							
Arochlor 1254							
Arochlor 1260							
30. Individual organochlorine pesticides ('OCPs') as listed below	USEPA SW-846 3540C or 3550C	As noted above, method 3540C is the Soxhlet extraction method. This method requires solvent extraction for 16-24 hours with very bulky equipment which limits how many samples can be done at once. This is not the way the major laboratories undertake	USEPA SW-846 8081B, 8082A or 8270D	Method 8081B indicates that method 8082A should no longer be used for a combined analysis of PCBs and organochlorine pesticides. That method (8082) should only be used for PCBs and 8081B should be used for OCPs. The chemicals covered by method 8081B do not include mirex,	0.1 mg/kg for each individual compound	Available for most of these chemicals. It is noted that achieving 0.1 mg/kg may be difficult for some of the less common chemicals listed. For example, hexachlorophene usually has an LOR of 10 mg/kg. It would	Yes for the common list of OCPs as per method 8081B. Accreditation for analysis of toxaphene is limited to 1 laboratory only in Australia.
Aldrin/dieldrin							
Chlordane							
DDT/DDD/DDE							
Endosulfan							

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
Endrin		such extraction and would cost significantly more than the standard approaches that are normally used if this method is to be enforced. The alternate method listed is for ultrasonic extraction. The main laboratories are likely to use that method. The laboratories may also use supercritical fluid extraction as per USEPA SW-846 3562. Analysis of 2,4,5-T by GC/ECD/MS (as per these methods) requires derivatisation. None of the sample preparation methods listed cover this step. Phenoxy herbicides (the group to which 2,4,5-T belongs) are more commonly assessed using LCMS.		hexachlorophene, pentachloronitrobenzene, pentachlorophenol or 2,4,5-T. Therefore, the use of this method (8081) would not be appropriate to cover the entire list in the order. Method 8082A does not include any of the chemicals in this list as it is now specifically targeting PCBs (groupings and individual compounds) so it should not be listed for this parameter group. The correct listing for method 8270 is 8270E not D. Method 8270E covers an extensive list of semi-volatile organics but does not include 2,4,5-T.		be very difficult to get to 0.1 mg/kg for this chemical. It is noted that there is not a single screen undertaken by a laboratory that covers this whole list. Separate analyses (each with a cost) would be required for: • Standard OCP list • Toxaphene • Phenoxy herbicides to get 2,4,5-T • Special phenols for pentachlorophenol • Hexachlorophene	Accreditation for analysis of hexachlorophene is limited to 3 laboratories only in Australia.
Endrin aldehyde							
Heptachlor							
Heptachlor epoxide							
Hexachlorobenzene							
Hexachlorophene							
Isodrin							
Methoxychlor							
Mirex							
Pentachloronitrobenzene							
Pentachlorophenol							
2,4,5-T							
Toxaphene							

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
31. Per- and polyfluoroalkyl substances ('PFAS') as listed below	USEPA draft method 1633 or ASTM D7968	USEPA draft method 1633 was only published in the second half of 2021 and errata are still being issued by USEPA when appropriate. This means the actual method is currently not in final form. It has only been subject to a single laboratory validation step. The multi-laboratory validation is underway at the time of writing. It is not expected to be published as a final method until the middle of 2022. This means the method may continue to change over the next 6 months, so it will not be clear that any analytical result was completed in strict accordance with the method over that time. ASTM D7968 is not a method preferred by the main laboratories, so it is unclear if this is actually available for routine use.	USEPA draft method 1633 or ASTM D7968	As per comment under sample preparation	0.005 mg/kg for PFOS+PFHxS and 0.005 mg/kg for PFOA	Available	Given that the method listed is a draft method it is not clear whether laboratories are (or even if they can be) NATA accredited for this method. They are NATA accredited for the analysis of these chemicals in soil, but it is likely that the method used is not likely to be either of those listed in the order.
PFOS+PFHxS							
PFOA							

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
32. Chlorinated hydrocarbons as listed below	USEPA SW-846 5035 or 5030B	Method 5035 is a purge and trap method for extraction of volatile organics from soil and waste samples. Method 5030B is a purge and trap method for extraction of volatile organics from water samples. There is a part of 5030B that is relevant for solid samples where high levels or oily materials are present once such materials have been extracted using 5035. This means the sample preparation requirements should indicate that the method to be used is USEPA SW-846 5035 with the addition of the relevant sections of 5030B when necessary/appropriate. It is noted that this was not made clear in Schedule B3 of the ASC NEPM either.	USEPA SW-846 8260B	USEPA SW-846 8260B does not actually exist any longer. The USEPA guidance has now updated this method a couple of times. The appropriate reference is now 8260D for analysis of these compounds by GCMS.	0.1 mg/kg for each compound	Most of the laboratories have standard LORs for these chemicals of 0.5 to 1 mg/kg. Undertaking analysis to reach the listed LOR would require specialised trace analysis. It can be done but would be at additional cost. Given the high volatility of these compounds, it is quite difficult to store materials (i.e. in a stockpile) or take samples in such a way to ensure there is no loss to the atmosphere. This is particularly critical to understand for low levels of contamination. This may mean results will always be below the LOR unless material has been highly contaminated by these solvents. If that had occurred this material would	The major laboratories are accredited by NATA for their standard approaches for these analyses. However, they may not be accredited for the specific methods listed in this order.
Trichloroethene (TCE)							
Tetrachloroethene (PCE)							
cis-1,2-Dichloroethene (cis-DCE)							
trans-1,2-Dichloroethene (trans-DCE)							
Vinyl chloride							

Parameter	Sample Preparation	Comment	Analytical Method	Comment	LOR	Comment	NATA
						not be eligible to be recovered soils/fines.	

Notes:

Rows are shaded/not shaded just to indicate the different groupings of chemicals

9 NATA Accreditation

As shown in **Table 3**, there are issues with NATA accreditation of the laboratories for the methods as specified in the NSW EPA draft orders. Many laboratories may not have the appropriate NATA accreditation for quite a large proportion of these parameters.

Table 4 provides a summary of whether NATA accreditation is likely to already be in place at the major laboratories for each parameter or grouping of parameters to make this matter clear.

Table 4: NATA accreditation summary

Parameter	
1. Mercury	NATA accreditation should be in place
2. Cadmium, 3. Lead, 4. Arsenic, 5. Chromium (total), 6. Copper, 7. Nickel, 8. Zinc	Laboratories are NATA accredited for their standard procedures for these analytes. However, the standard procedures are not what these orders are requiring laboratories to do. Laboratories cannot achieve good workflows using microwave digestion, so they are unlikely to change to this method. If they do, it will cost more than the current pricing. The orders do not list as acceptable the standard sample preparation method used by the major laboratories. This means there is likely to be an implementation issue for these parameters – with the procedures being used and/or with NATA accreditation in line with the draft orders.
9. Electrical Conductivity	NATA accreditation should be in place
10. pH	NATA accreditation should be in place
11. Total Polycyclic Aromatic Hydrocarbons ('PAHs')	Laboratories are NATA accredited for their standard procedures for these analytes. However, the standard procedures are not what these orders are requiring laboratories to do. The orders list Soxhlet extraction or ultrasonic extraction as the only acceptable sample preparation methods based on the method numbers listed. The orders list Soxhlet extraction or supercritical fluid extraction as the only acceptable sample preparation methods based on the text in the methods table. Most laboratories use the method listed in the ASC NEPM and CRC CARE Technical Report 10 – solvent extraction using end over end mixing for 1 hour. This means there is likely to be an implementation issue for these parameters – with the procedures being used and/or with NATA accreditation in line with the draft orders.
12. Benzo(a)pyrene TEQ	Same comment as above (i.e. parameter 11)
13. Naphthalene	Same comment as above (i.e. parameter 11 and 12)
14. Benzene, 15. Toluene, 16. Ethylbenzene ,17. Xylenes	Laboratories are NATA accredited for their standard procedures for these analytes. However, these orders list an out of date (therefore, incorrect) method number for the analytical procedure. While this is unlikely to make a lot of difference to the actual procedure used, NATA accreditation will be based on the correct method number so, strictly speaking, the laboratories will not be able to say they are NATA accredited for the analysis. This should be simple to address.
18. Total Recoverable Hydrocarbons (TRH) F1	NATA accreditation should be in place

Parameter	
19. TRH F2, 20. TRH F3 (>C16 - C34), 21. TRH F4 (>C34 - C40)	Laboratories are NATA accredited for their standard procedures for these analytes. However, the standard procedures are not what these orders are requiring laboratories to do. The acceptable methods listed for sample preparation are not in line with what the major laboratories do. Most laboratories use the method listed in the ASC NEPM and CRC CARE Technical Report 10 – solvent extraction using end over end mixing for 1 hour. This means there is likely to be an implementation issue for these parameters – with the procedures being used and/or with NATA accreditation in line with the draft orders.
23. Paper and cardboard, asphalt, cloth, paint, rubber, 24. Hard plastic, 25. Light plastic, 26. Glass, 27. Metal, 28. Wood	Laboratories are NATA accredited for their standard procedures for the standard categories for these analytes. However, the standard procedures are not what these orders are requiring laboratories to do. These orders require quite a number of variations from the listed method including using a different sieve size and separating small pieces of materials into a different set of categories than is normally undertaken as well as achieving different limits of reporting. This means there is likely to be an implementation issue for these parameters – with the procedures being used and/or with NATA accreditation in line with the draft orders.
29. Polychlorinated biphenyls ('PCBs')	Laboratories are NATA accredited for their standard procedures for these analytes. However, the standard procedures are not necessarily what these orders are requiring laboratories to do. The sample preparation methods listed are soxhlet extraction or ultrasonic extraction. Laboratories definitely do not use Soxhlet extraction. They may use ultrasonic extraction. They may also used end over end tumbling as per Schedule B3 of ASC NEPM given that they also use this method for a wide range of organic contaminants. This means there is likely to be an implementation issue for these parameters – with the procedures being used and/or with NATA accreditation in line with the draft orders. In addition, a number of analytical procedures are listed, only one of which is now considered appropriate for PCBs by USEPA. The laboratories are likely to be NATA accredited for the correct one.
30. Individual organochlorine pesticides ('OCPs') as listed below Aldrin/dieldrin Chlordane DDT/DDD/DDE Endosulfan Endrin Endrin aldehyde Heptachlor Heptachlor epoxide Hexachlorobenzene Hexachlorophene Isodrin Methoxychlor Mirex Pentachloronitrobenzene	In regard to the standard list of organochlorine pesticides, the same comments apply as listed for PCBs in regard to sample preparation. Separate additional analyses are required for the following: • Toxaphene– the methods listed in the orders are relevant in line with the comments for PCBs provided above in regard to sample preparation, but it is noted that only 1 lab in Australia is NATA accredited for analysing this chemical. • Phenoxy herbicides (for 2,4,5-T) – the methods listed in these orders are not relevant for this group of chemicals so, while labs will be NATA accredited for their standard methods for 2,4,5-T, they will not be NATA accredited for analysing for 2,4,5-T via the methods listed in these orders. • Mirex – some of the methods listed in the orders are relevant for mirex (i.e. 8270E is relevant but 8081B is not) in line with the comments for PCBs provided above in regard to sample preparation and NATA accreditation.

Parameter	
Pentachlorophenol	• Phenols (for pentachlorophenol) – some of the methods listed in the orders are relevant for pentachlorophenol (i.e. 8270E is relevant but 8081B is not) in line with the comments for PCBs provided above in regard to sample preparation and NATA accreditation. • Hexachlorophene – some of the methods listed in the orders are relevant for hexachlorophene (i.e. 8270E is relevant but 8081B is not), but it is noted that only 3 labs in Australia is NATA accredited for analysing this chemical.
2,4,5-T	
Toxaphene	
31. Per- and polyfluoroalkyl substances ('PFAS')	NATA accreditation based on the methods listed in these orders is likely to be problematic. The draft USEPA method is not likely to be finalised until later in 2022 and NATA may not agree to accredit labs based on that method until it is issued as a final. The other method is not one preferred by laboratories so may not be the basis of their accreditation. At least some of the laboratories have indicated that the draft USEPA method is looking like it will become the preferred method once it is finalised but until then the issue with NATA accreditation remains. Before finalising these orders, it would be useful to ask NATA what their preference would be.
32. Chlorinated hydrocarbons	Laboratories are NATA accredited for their standard procedures for these analytes. However, these orders list an out of date (therefore, incorrect) method number for the analytical procedure. While this is unlikely to make a lot of difference to the actual procedure used, NATA accreditation will be based on the correct method number so, strictly speaking, the laboratories will not be able to say they are NATA accredited for the analysis. This is likely to be simple to address. However, the limits of reporting required for this group of chemicals in these orders may be more difficult to comply with.

From this review, it can be seen that there may be issues in regard to NATA accreditation for nearly all of the 32 parameters listed based on the specific methods being required by NSW EPA which are not in line with current standard practice. There are issues with almost 90% of the methods (excluding asbestos which is discussed in detail in **Section 11**). Addressing accreditation issues will take some time and is likely to impact on the time for transition.

10 Limits of reporting

As shown in **Table 3**, there are issues with some of the limits of reporting specified in the draft orders. This will result in difficulties in demonstrating compliance with the absolute maximum and maximum average concentrations listed in Table 2 in each of the draft orders.

The limit of reporting is the value where the laboratory is confident of a number of matters including:

- that the signal they see on the machine is not noise
- that it is different from what would be seen if a blank sample was put through the analytical method
- that it is within the calibration range of the equipment/method
- that the response of the equipment is of sufficient size to be measurable with a reasonable degree of accuracy and precision (often ± 20% but it depends on the method).

The measurement error in any result is much larger the closer to the limit of reporting. This means, the closer to the limit of reporting a guideline is, the more difficult it is to undertake monitoring that demonstrates compliance with confidence or to have confidence that a product can be produced that will generally be in compliance. Having criteria at the limit of reporting is highly problematic.

In Schedule B3 of the ASC NEPM, it is recommended that the limit of reporting that should be requested from a laboratory for a particular type of analysis is not more than 20% of the soil guideline being used to demonstrate that soil is in compliance. This gives a 5 fold factor between the smallest level that can be detected and a guideline concentration and means there can be confidence that the result reported is quantified robustly and it is clear whether a sample complies with the relevant guideline or not.

Achieving this, however, is not always possible for all chemicals as there are limitations to the analytical methods.

In addition to potential for laboratories to not be able to achieve the limits of reporting listed in the methods table for the draft orders as discussed in **Table 3**, there will also be difficulties in demonstrating compliance with these criteria, given the limits of reporting required for some parameters in the draft orders.

Table 5 provides a comparison of the limits of reporting as specified in the draft orders (including noting where these are not achievable) and the absolute maximum concentrations from the NSW EPA recovered soils order to highlight the parameters that may be difficult.

Table 5: Comparison – LORs and Criteria

Parameter	Recovered soil		Limits of reporting	Comment
	Maximum average concentration/value	Absolute maximum concentration/value		
1. Mercury	0.5 mg/kg	1 mg/kg	<0.2 mg/kg	--
2. Cadmium	0.5 mg/kg	1 mg/kg	<10% of the relevant AMC	--
3. Lead	75 mg/kg	150 mg/kg		
4. Arsenic	20 mg/kg	40 mg/kg		
5. Chromium (total)	75 mg/kg	150 mg/kg		
6. Copper	100 mg/kg	250 mg/kg		
7. Nickel	40 mg/kg	80 mg/kg		
8. Zinc	150 mg/kg	450 mg/kg		
9. Electrical Conductivity	2.5 dS/cm	3.5 dS/cm	0.001 dS/cm	--
10. pH	5-9	4.5-10	0.1 pH unit	--
11. Total Polycyclic Aromatic Hydrocarbons ('PAHs')	20 mg/kg	50 mg/kg	0.1 mg/kg for each individual compound – this results in a sum of 1.6 mg/kg	--
12. Benzo(a)pyrene TEQ	1 mg/kg	3 mg/kg	0.3 mg/kg	--
13. Naphthalene	1 mg/kg	2 mg/kg	0.1 mg/kg	--
14. Benzene	Not applicable	0.5 mg/kg	0.1 mg/kg	--
15. Toluene	Not applicable	65 mg/kg	0.1 mg/kg	--
16. Ethylbenzene	Not applicable	25 mg/kg	0.1 mg/kg	--
17. Xylenes	Not applicable	15 mg/kg	0.3 mg/kg	--
18. Total Recoverable Hydrocarbons (TRH) F1	Not applicable	30 mg/kg	25 mg/kg	Potential issue – it is noted that common LORs for this method are lower than that required in the draft order
19. TRH F2	Not applicable	80 mg/kg	25 mg/kg	Potential issue – the common LOR is 50 mg/kg for this fraction
20. TRH F3 (>C16 - C34)	Not applicable	150 mg/kg	100 mg/kg	Potential issue
21. TRH F4 (>C34 - C40)	Not applicable	450 mg/kg	120 mg/kg	Potential issue
22. Asbestos fines/ fibrous asbestos	Not applicable	No asbestos found	0.1 g/kg (i.e. 0.01%)	See **Section 11**
23. Paper and cardboard, asphalt, cloth, paint, rubber	0.05%	0.1%	0.05%	Potential issue – method listed LOR is 0.1% so method
24. Hard plastic	Not applicable	0.1%	0.01%	

Parameter	Recovered soil		Limits of reporting	Comment
	Maximum average concentration/value	Absolute maximum concentration/value		
25. Light plastic	Not applicable	0.01%	0.01%	needs to be validated for new categories and lower LORs
26. Glass	0.05%	0.1%	0.05%	
27. Metal	0.05%	0.1%	0.05%	
28. Wood	0.05%	0.1%	0.05%	
29. Polychlorinated bi-phenyls ('PCBs')	Not applicable	0.2 mg/kg for each arochlor	0.2 mg/kg for each arochlor	Potential issue – AMC is the same as the LOR
30. Individual organochlorine pesticides ('OCPs')	Not applicable	0.1 mg/kg for each listed chemical	0.1 mg/kg for each listed chemical	Potential issue – AMC is the same as the LOR Potential issue – this LOR is not achievable for at least some of the listed chemicals in this group – for some of the listed chemicals this LOR may only be available at additional cost
31. Per- and polyfluoroalkyl substances ('PFAS')	Not applicable	0.005 mg/kg	0.005 mg/kg for each chemical/group	Potential issue – AMC is the same as the LOR
32. Chlorinated hydrocarbons	Not applicable	0.1 mg/kg	0.1 mg/kg for each listed chemical	Potential issue – AMC is the same as the LOR Potential issue – this LOR is only available at additional cost

From this review, it can be seen that there may be issues in regard to achieving the limit of reporting or demonstrating compliance with the AMC based on uncertainty/measurement error at the AMC because it is close to or at the limit of reporting for 14 of the 32 parameters listed – i.e. approximately half (excluding asbestos which is discussed in detail in the following section).

11 Asbestos

11.1 Background

As noted by enHealth in 2013 (enHealth 2013):

"We are all exposed to low levels of asbestos in the air we breathe every day."

This Commonwealth guidance states quite clearly that there are between 10 and 200 fibres in every cubic metre of air we are breathing all day every day, particularly in urban areas (enHealth 2013).

Consequently, it is no surprise that it is possible that asbestos may be found in C&D waste or soil being brought in for processing to produce recovered soil or recovered fines.

Asbestos may be present in these materials due to the use of asbestos containing materials in construction but it also may be present in these materials due to it being naturally occurring in soils being excavated or because it settles onto materials from the atmosphere – i.e. having nothing to do with building and demolition waste.

Naturally occurring material in soil could get mixed into waste at a construction site but it could also mix into the waste during transport, at the processing site or, importantly, at the location where recovered fines or soil is actually used well after it was prepared in accordance with these orders.

Fibres present in the atmosphere can settle on these materials at any time from sources that having nothing to do with the source building and demolition waste.

While requiring robust methods are in place to ensure asbestos containing materials from building and demolition do not get included in materials that are sources for recovered soils or fines may be an appropriate way of managing the potential for asbestos containing materials to be present in material to be processed, such procedures cannot address the presence of asbestos fibres from soil where asbestos is naturally occurring or from fibres settling from the atmosphere.

There are no procedures by which asbestos fibres settling out of the atmosphere from unrelated sources can be managed either on a demolition site or at processing facilities or end use sites just as there is no way to manage the settling of dust from the atmosphere onto surfaces around a home – requiring regular dusting. It is also difficult to predict whether asbestos is naturally occurring at a demolition site without significant testing.

enHealth has clearly indicated that exposure to low levels of asbestos fibres is something that occurs for all of us every day and that such exposure poses a low risk to health.

This means that, even if all steps are taken to prevent asbestos containing materials entering the material to be used for recovered soils or fines, there is no way to ensure there are zero asbestos fibres.

Impacts on human health from exposure to asbestos only occur if the asbestos fibres are inhaled, so fibres need to be of appropriate size to be respirable (i.e. to be breathed down into the lungs) and to get into the air and be suspended there.

11.2 Analysis

There are a number of methods for investigating the presence of asbestos in materials such as recovered fines/soils. The following description of the various methods is provided to be completely clear about what is required for each of the methods and how they are used.

Field test for bonded asbestos containing materials (ACM)

This method is mentioned in the ASC NEPM and requires a sample of material of at least 10 L to be sieved (using 7 mm sieve) in the field to look for small pieces of bonded ACM (i.e. fibrous cement pieces). It is normally undertaken in the field by the person undertaking the sampling. This is not identified as being in accordance with any standard method, but this approach was adopted within the ASC NEPM based on guidance from WA Department of Health in 2009 (WA DOH 2009) to identify any small pieces of material that could be fibrous cement sheeting (i.e. bonded ACM).

If any pieces of bonded ACM (or suspected bonded ACM) are found, then those pieces (or representative subset) are usually sent to a laboratory to determine if they contain asbestos fibres or some other type of fibre that is not asbestos. The laboratory is required to undertake this analysis using AS4964-2004.

Field assessment of a 10 L sample to look for small pieces does not appear to be required for use for recovered fines or soils but is a requirement for contaminated land investigations.

AS4964-2004

This is the Australian standard method for the qualitative identification of asbestos in bulk samples – i.e. it was originally designed to look at a bulk sample to see if any fibres could be found. It is not strictly a quantitative method.

The most important information in this method statement is the explanation about how to identify the presence of fibres and their type using polarised light microscopy. This is the primary method for evaluating the fibres and is the approach adopted in all relevant methods for analysis of asbestos.

This method recommends the collection of a representative sample but does not actually indicate the preferred size of the sample when assessing soils. Appendix C of the method indicates that a sample of 5-100 g is relevant for building materials being tested for the presence of asbestos (i.e. cement sheeting, floor tiles etc). However, this appendix does not indicate a suggested sample size for soils or ores but rather directs the reader to AS4482.1 or AS4433.1.

It has become standard practice for the laboratories to accept a sample of approximately 50 g for this method.

The overall method involves:

- Sieving the entire sample through a 10 mm sieve, if there is a significant amount of larger particles in the sample
- >10 mm fraction is then examined to look for ACM/fibrous matter which is collected for PLM microscopy
- Sieving the <10 mm fraction through 2 mm sieve
- >2 mm fraction is then examined to look for ACM/fibrous matter which is collected for PLM microscopy
- Examination of the <2 mm fraction by light microscope to identify ACM/fibrous matter for PLM microscopy
- All materials collected need to be assessed using the PLM microscopy
- In addition, the <2 mm fraction is then subjected to trace analysis where small sub samples are suspended in an oil to allow more detailed evaluation to look for individual fibres rather than fibre bundles (this is the “TRACE” step).

To enable this method to be quantitative, the weight of the entire sample submitted must be measured along with the total weight of all of the materials identified as ACM or fibre bundles from each fraction.

It is not possible to weigh individual fibres, so the method indicates that if no asbestos containing materials have been found in the various fractions and the trace method (last step) does not find any fibres, then that is equivalent to a limit of reporting of 1 in 10,000 to 1 in 1,000 parts by weight (i.e. 0.1-1 g/kg or 0.01-0.1%). The method also indicates that if no asbestos fibres are found in the trace analysis this means there are no detectable respirable fibres.

ASC NEPM

The ASC NEPM refers to AS4964-2004 as the method to follow but specifies that a sample of soil of at least 500 mL should be collected for each location tested rather than the 50 g sample commonly analysed as per AS4964-2004. This means the sample size is around 700-800 g.

Draft recovered fines/soil orders

The draft orders being discussed here also refer to AS4964-2004 as the method to follow with a number of variations.

The orders require that the sample size be at least 1 kg (i.e. 1,000 g). Unlike other types of analyses, the entire sample supplied to the laboratory must be analysed for asbestos. So changing the sample size changes the amount of work required in the laboratory to undertake the work – larger sample size = longer time for analysis to be completed per sample.

The method description in these orders requires the use of 7 mm sieve rather than a 10 mm sieve as listed in AS4964-2004. This appears to be a combination of approaches – the ASC NEPM field test and AS4964-2004.

This means the laboratories are likely to have to adjust their normal procedures which could impact on their current NATA accreditation status for the relevant method. Changing a method statement to use a 7 mm sieve instead of a 10 mm sieve is likely to need to be recorded and notified to NATA at the very least.

Adjusting sample size does not impact on NATA accreditation status but does impact on the amount of time taken per sample. If samples take longer to analyse this will reduce the number of samples that can be covered per analyst per day meaning this NSW EPA adjusted version of the test for asbestos will cost more per sample. Current standard costs for a one off sample for asbestos in soil using the ASC NEPM sample size are in the range $70-$150 per sample. This cost will be higher for samples complying with these orders.

The draft orders also include the following statement:

Where an accredited laboratory has observed or measured asbestos below the limit of reporting, the laboratory must still report that asbestos was observed.

It is not entirely clear what exactly this means, given the wording in AS4964-2004.

AS4964-2004 states that a result should be reported as ***"no asbestos detected by polarised light microscopy including dispersion sampling"*** if less than 5 fibres definitively identified as asbestos are found on each of the 2 slides required to be assessed (i.e. 10 or less fibres) during the trace analysis step and no asbestos materials were found in any other fraction. The method notes that such a small number of fibres (10 fibres or less) could be due to contamination during analysis and may not be a real result which is why they recommend this reporting statement.

It is not clear why this change to the method statement has been made or whether it is valid.

Given the way the method statement is written, the experts who prepared this standard clearly decided that 5-10 fibres or less using the trace analysis step could not be confidently viewed as a real result for the sample "as received" for analysis by the laboratory. It will always be possible that such a result was due to contamination from within the laboratory.

Changing the interpretation of the results of a particular method statement should be left to experts in the field.

It should be noted that laboratories may not agree to apply the change in reporting being required by NSW EPA.

Being required to be confident to stand in court and state that a fibre or two observed using the trace part of the method were definitively present in the actual sample when it was received for analysis will be difficult, given that the Australian Standard method says that those low numbers of fibres could be from contamination in the laboratory.

12 Acid sulfate soils

The draft orders require that the material processed to produce recovered fines or soils does not contain acid sulfate soils.

Acid sulfate soils are natural materials (historical sediments) that contain iron sulfides. They are present in coastal areas. When they are disturbed or exposed to air, the sulfides can react with oxygen forming sulfuric acid which poses a risk to the environment.

There are a number of aspects that are important to note:

- Such soils are generally only present in coastal areas or in areas close to major waterways/wetlands so there should be no requirement to consider this aspect in areas that could not contain such materials.
- It is a requirement of development applications in NSW that the presence or potential presence of acid sulfate soils must be documented. If such materials are present, then the proponent of a development must prepare an acid sulfate soils management plan and abide by that plan in managing such materials on-site or when they dispose of them.
- Such plans could be required to include a statement that these materials not be supplied for processing into recovered soils or fines so that the responsibility is on the person generating the waste rather than those accepting material for reprocessing/resource recovery.
- NSW EPA provides guidance on how to classify wastes containing acid sulfate soils in "Waste classification guidelines, Part 4: acid sulfate soils". This guidance places strict requirements on how such soils can be managed and/or disposed. It would appear to be unacceptable for such materials to be included in material for resource recovery.

It is not clear why additional requirements are necessary in these orders, given all of these existing requirements for such materials.

Currently, the orders require that some sort of assessment of acid sulfate soils needs to be undertaken to demonstrate that the material does not contain such soils. However, the only guidance provided about how such an assessment is to be undertaken is provided in Section 8 of the orders – i.e. definitions.

The definition is as follows:

acid sulfate soil *includes potential acid sulfate soil and means naturally occurring sediments and soils which contain sulfides such as iron sulfide and iron disulfide or their precursors, as evidenced by:*

(a) If sampling and testing is undertaken for acid sulfate soil using a NATA accredited chromium reducible sulfur test method – a net acidity greater than 18 mol H+/tonne; or

(b) If sampling and testing is not undertaken for acid sulfate soil – a low or high probability of presence of acid sulfate soil at the premises based on the applicable Acid Sulfate Soil Risk Maps (published by the former Department of Land and Water Conservation and available at: https://www.environment.nsw.gov.au/topics/land-and-soil/soil-degradation/acid-sulfate-soils).

This definition does allow the assessment of potential for acid sulfate soils to be based on the Acid Sulfate Soil Risk Maps which have been published by government agencies in NSW. This means that it will not be necessary to undertake laboratory assessment in all circumstances.

The only time laboratory analysis may be required would then be if the risk maps indicate that a location has a high probability of containing these materials. This definition notes that when laboratory testing is required it must be done by a NATA accredited laboratory, however, the orders do not list which methods the laboratory must be accredited for to fulfil this requirement.

Guidance is available detailing what methods are required in the NSW Acid Sulfate Soil Manual, but this guidance is not mentioned in these orders.

The cost for undertaking this analysis is around **$70-$130 per sample** (excluding GST) depending on the exact requirements. This cost was not included in the total costs discussed in **Section 8**.

It is not expected that this laboratory analysis would be required for every sample but the specifics of what will constitute acceptable evidence will need to be understood during implementation of these orders.

13 Stockpile sampling requirements

The draft orders provide requirements for how materials are to be stockpiled at a site and how each stockpile is to be sampled. The orders require that stockpiles or batches be no larger than 2,000 tonnes but they can be smaller than this size. A stockpile of 2,000 tonnes is approximately 1,300 m^3 assuming a density of 1.5 t/m^3.

Section 7.5.2 of Schedule B2 of the ASC NEPM indicates sampling requirements for stockpiles of up to 200 m^3. For a stockpile of 200 m^3, it is required that at least 8 samples be collected. This guidance also notes that if there is a wide range in the concentrations of contaminants in then more samples may be necessary to get a good understanding of the characteristics of the soil.

The draft orders require the following sampling rates for most parameters:

- <250 t (i.e. about 160 m^3) – 8 samples
- 250-500 t (i.e. about 160-300 m^3) – 9 samples
- 500-1,000 t (i.e. about 300-700 m^3) – 10 samples
- 1,000-1,500 t (i.e. about 700-1,000 m^3) – 12 samples
- 1,500-2,000 t (i.e. about 1,000-1,300 m^3) – 14 samples

EPA Victoria indicates around 1 sample per 25 m^3 for stockpiles up to and above 200 m^3 and 1 additional sample per 250 m^3 for larger volumes (EPA Victoria 2009).

It appears that the draft orders have used the same base rate required for stockpiles being sampled for contaminated land investigations – i.e. 8 samples for around 200 m^3 (i.e. 1 sample per 25m^3). The sampling rates for the larger stockpiles relevant for this activity have then been determined using a rate of 1 additional sample per 250 m^3 above that initial 8 samples for around 200 m^3.

These rates seem to be line with common practice.

14 Sample management at the laboratories

There are a number of practical issues for laboratories that are relevant when considering the size of samples and the number of samples that are required to be provided for these analyses. Consideration needs to be given to the practicalities of:

- Storing samples for up to around 2 months
- Disposal requirements once no longer required.

Samples for the range of analyses required for compliance must be more than 7 kg per sample. Each sample must include 6 kg for the physical contaminants analysis, 1 kg for the asbestos analysis and additional smaller amounts for all the other required analyses.

If the industry produces around 1,200,000 tonnes per year of these materials, then that is at least 8,000 samples per year assuming the maximum stockpile size is applied (it would be more than this if smaller stockpile sizes are used). If there are 8,000 samples and each of them is around 8 kg, then that is 64,000 kg or 64 t of material.

Laboratories are required to keep samples for a certain period after analysis is complete in case any questions arise that require checking or re-analysis. This means that the laboratories would need to be able to store around 5 tonnes of samples per month or 10 tonnes if storage is required for a 2 month period. This also means that the laboratories must dispose of around 5 tonnes of samples per month.

The costs for storage and disposal would need to be considered in pricing these analyses. It is not known if this is a significant addition to current sample storage and disposal requirements but, given the required sample size, it may well be and costs are likely to need to be considered in the pricing schedule.

15 Conclusions

Recovery and reuse of materials from construction and demolition waste has been underway in NSW for about a decade under the resource recovery order/exemption system. NSW EPA administers this system.

In the last two years, the NSW EPA has been reviewing this system. In the second half of 2021, they proposed to revoke the orders and exemptions relevant to the recovered fines category and the introduction of a new category – recovered soils. Comment from industry was sought.

In February 2022, a new set of draft orders/exemptions were issued for comment by NSW EPA after considering the comments received in 2021.

This letter provides advice on technical issues related to these new draft orders. A range of issues have been identified.

- *Chemical parameters used to indicate that the materials are of appropriate quality for reuse* – the overall list of individual chemicals and groups of chemicals are similar to those required for contaminated land investigations, however, the list includes some difficult aspects:
    - organochlorine pesticides – the range of chemicals listed includes chemicals that are not normally assessed for contaminated land investigations and, for a number, would never be expected to be present in the materials used to produce recovered fines/soils.
    - chlorinated hydrocarbons – these chemicals are not normally assessed in soils due to their volatile characteristics and the limitations of the analytical methods.
    - physical contaminants – not the normal listing for these materials.
- *Analysis of these materials* – there are a number of aspects of the analytical requirements of these orders that are important to highlight:
    - Based on a survey of some of the major laboratories, the cost for the analysis of a single sample to meet the requirements of these orders would be in the range **$700-$1,100 per sample** (excluding GST). Once requirements are finalised and contracts could be negotiated, this cost is likely to decrease – perhaps to the lower end of this range.
    - Standard turnaround time at the laboratory for this group of analyses will be 5 days so from the day processing was completed until the day a stockpile could be transported off the site would be 5 days. Once requirements are finalised and contracts can be negotiated with particular laboratories, the turn around time may be able to decrease but it is unlikely that it will be possible to achieve a 1 day turnaround time even if the increased cost was acceptable, given the large number of required analyses and the time they each take.
    - There would need to be a suitable period for transitional arrangements. This would be a significant new source of samples for the laboratories. Clearly, they could work up to having adequate capacity (by buying new equipment and employing new staff) but this would make initial implementation of the orders difficult. It can take around 3 months for a complex piece of analytical equipment to arrive and be installed. It would also take some time to train new staff particularly for the asbestos and physical contaminants methods.
    - A review of the specific analytical methods listed in these orders for each chemical or chemical group has identified a variety of matters that will make implementation difficult. These include, for one or more parameter:
        - Incorrect or out of date method numbers.
        - Method numbers that do not correspond to the method descriptions in the text.

- Methods that are not currently used for a specific analysis in Australia – the methods that are currently used do not appear to be permissible as they are not listed.
- Limits of reporting that are not achievable by the commercial laboratories.
- Variations to standard methods which are not covered in the method, may impact on current work practices at the laboratory (impacts transitional arrangements), and may mean the laboratory is no longer NATA accredited for the varied method.

- *NATA accreditation* – NATA accreditation is provided on a method basis not a laboratory basis so each method to be used must have been assessed and accredited by NATA. If a laboratory does not have the appropriate method already covered in their accreditation it can take 6-12 months to obtain such accreditation. Almost 90% of the methods listed in the order require methods that are not currently standard approaches used by the laboratories. This may require changes to NATA accreditation for some laboratories. It is possible that some laboratories may decide not to take on this work because they do not want to change their normal procedures or to have 2 different sets of procedures for the same parameters running at the same time through their laboratories.
- *Limits of reporting/criteria* – for a number of parameters, the required maximum acceptable concentration that can be present in a sample is equal to or lower than the relevant laboratory limit of reporting listed with the analytical method or able to be provided by the laboratories. This means demonstrating compliance with the criteria will be difficult due to the impact of measurement error at these low/sensitive levels. This matter affects approximately half of the listed parameters.
- *Asbestos* – there are a range of aspects of the requirements for asbestos listed in the draft orders that may impact on the implementation:
    - Method listed in the orders includes a number of variations from the standard base method. These changes may impact on NATA accreditation and normal work practices in the laboratories. Such changes will impact on analytical costs and the time taken for each sample.
    - The standard base method indicates that if 5 fibres or less are identified using the trace aspect of this analysis then this should be identified as “no asbestos detected by polarised light microscopy including dispersion sampling”. This is because, given that asbestos fibres are naturally occurring and always present in the atmosphere including inside a laboratory, it is not possible to be confident that 5 fibres or less were actually present in the original sample – contamination in the laboratory is quite possible.
    - The method variation in these orders requires that, if even 1 fibre is observed using the trace aspect of this analysis, the laboratory must report that asbestos was observed for the purposes of demonstrating compliance.
    - This appears to be in contradiction with the view of experts who were involved in writing the Australian Standard and the normal theoretical underpinnings of analytical chemistry.
    - Some laboratories may not be comfortable with changing the way they report such results, should such results have the potential to be used in court.
- *Acid sulfate soils* – there are a number of aspects that are important to note:
    - Such soils are generally only present in coastal areas or in areas close to major waterways/wetlands so there should be no requirement to consider this aspect in areas that could not contain such materials.
    - It is a requirement of development applications in NSW that the presence or potential presence of acid sulfate soils must be documented. If such materials are present, then the proponent of a development must prepare an acid sulfate soils management plan and abide by that plan in managing such materials on-site or when they dispose of them.

- Such plans could be required to include a statement that these materials not be supplied for processing into recovered soils or fines so that the responsibility is on the person generating the waste rather than those accepting material for reprocessing/resource recovery.
- NSW EPA provides guidance on how to classify wastes containing acid sulfate soils in "Waste classification guidelines, Part 4: acid sulfate soils". This guidance places strict requirements on how such soils can be managed and/or disposed. It would appear to be unacceptable for such materials to be included in material for resource recovery.
- If this requirement is to remain in the orders, it is noted that most acid sulfate soil assessments will take the form of checking NSW government maps to determine if a site is within an area where these materials may be present – this will require detailed knowledge of the source location for all materials prior to their arrival at the processing site.
- Only materials from areas that have a high probability of such materials would require detailed laboratory analysis which would cost **$70-$130 per sample** (excluding GST). This cost is in addition to the analysis costs discussed above.

- *Stockpile sampling requirements* – the stockpile sampling requirements listed in these orders appear to be in line with commonly used stockpile sampling rates used in contaminated land and other relevant industries.
- *Laboratory sample management* – the laboratories will need to be able to store 5-10 tonnes of samples at any one time in addition to current requirements. They will also need to be able to dispose appropriately of around 5 tonnes per month. Costs to ensure this can happen will have to be passed onto the industry by the laboratories.

16 Limitations

Environmental Risk Sciences has prepared this report for the use of WCRA and WMRR in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

It is prepared in accordance with the scope of work and for the purpose outlined at the beginning of this letter report.

The methodology adopted and sources of information used are outlined in this report. Environmental Risk Sciences has made no independent verification of this information beyond the agreed scope of works and assumes no responsibility for any inaccuracies or omissions. No indications were found that information provided was false.

This report was prepared in February/March 2022 and is based on the information provided and reviewed at that time. Environmental Risk Sciences disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

17 References

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18 Closure

If you require any additional information, please do not hesitate to contact us on (02) 9614 0297.

Yours sincerely,

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Industry, Recycling and Economic Impacts

From changes to recovered fines and soils orders and exemptions

Contents

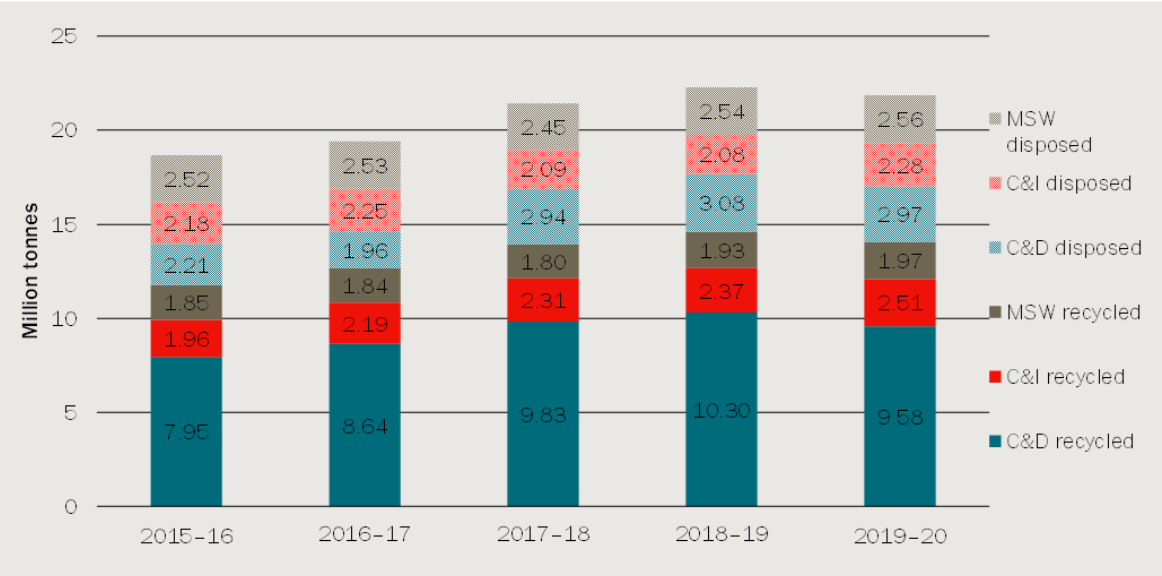
Industry Background

C&D Waste Management

C&D recycling is the largest recycling sector within the NSW recycling industry, with an annual revenue in the order of around $500 million per year[1]. The industry employs over 580 full time equivalents (FTEs) for mixed waste recycling and 450 FTEs for source-separated recycling.

As shown in figure 1.1 below over the five years there has been a significant increase in the generation of C&D waste of 24-32 per cent and recycling of C&D waste increased 21-30 per cent while other waste streams remained static .

1.1 Waste recycled and disposed, by waste stream



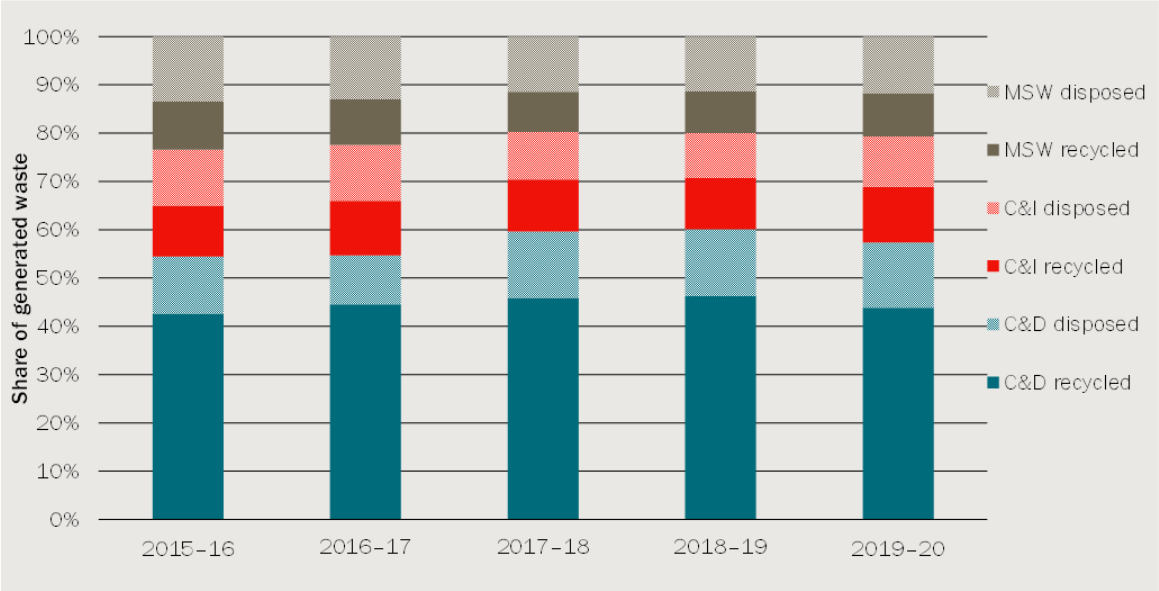
Note: C&D (construction and demolition), C&I (commercial and industrial), MSW (municipal solid waste)

Source: https://www.epa.nsw.gov.au/your-environment/waste/waste-overview/waste-performance-data

C&D waste accounts for almost 60% of the total waste generated in NSW and has a recovery rate above 75%, the highest recovery rate of all waste streams. This is 24 percentage points higher than the C&I recycling sector and 33 percentage points higher than the C&I and MSW recycling sector, respectively (Figure 1.2 and 1.3).

[1] CIE 2021, Better Regulation Statement for proposed changes to recovered fines and recovered soils

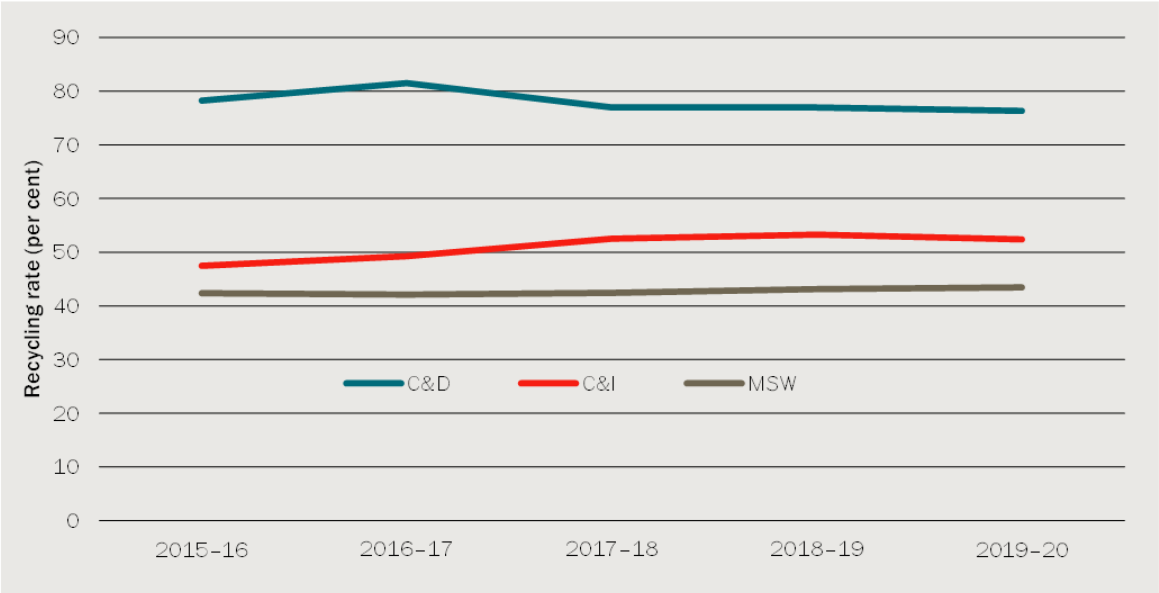
1.2 Share of total annual waste generation



Note: C&D (construction and demolition), C&I (commercial and industrial), MSW (municipal solid waste)

Source: https://www.epa.nsw.gov.au/your-environment/waste/waste-overview/waste-performance-data

1.3 Recycling rate, by waste stream



Data source: https://www.epa.nsw.gov.au/your-environment/waste/waste-overview/waste-performance-data

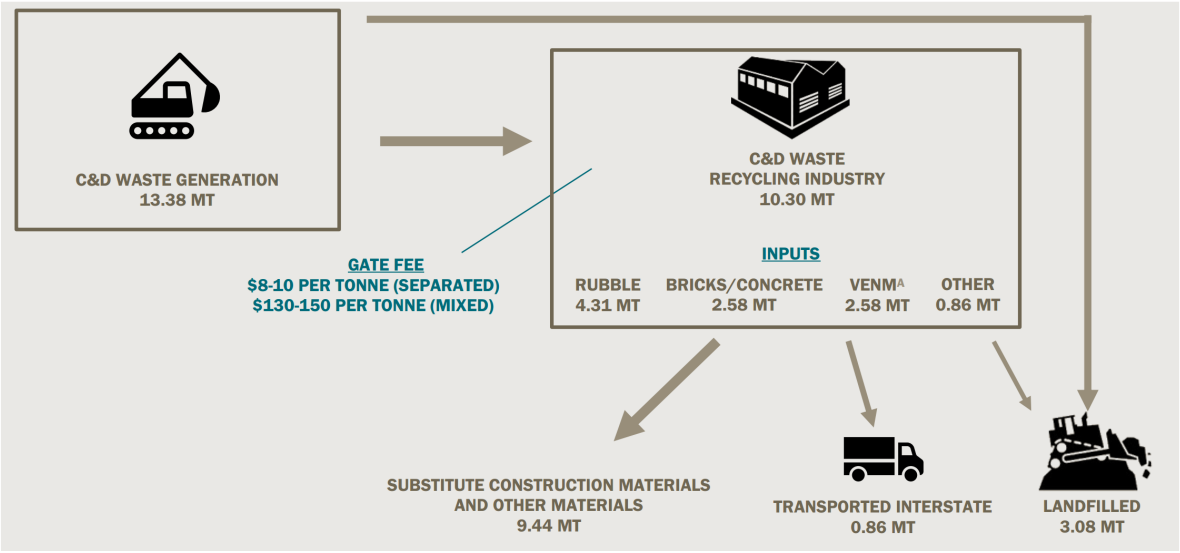
The C&D recycling sector was the only recycling sector close to achieving the NSW targets in the previous *Waste and Resource Recovery Strategy 2014-21*, and would likely be the only sector close to achieving the targets of the recently released WaSMS. However, as detailed below it is highly unlikely these targets could be met if the proposed Orders and Exemptions are implemented.

The C&D recycling covered within this response is not all C&D recycling, as some materials such as metals will go to other recyclers, and some materials have in the past been sent interstate (the likelihood of which may increase under the proposed orders and exemptions). The data provided by the C&D recycling industry used in this response equates to approximately 7.4 million tonnes of waste per year, of which:

- 4.5 million tonnes or 61 % is source-separated, and
- 2.9 million tonnes or 39 % is mixed waste.

Industry assessment is that the recovery rates are 99% (source separated) and 80% (mixed waste), for material that is sent to the recycling facilities.

1.4 2018/19 NSW C&D waste industry overview



[A] Virgin Excavated Natural Material (excavated material surplus from civil construction projects, e.g., tunnel spoil)

Note: MT is mega tonnes; Totals may not sum due to rounding.

Source: National Waste Database 2020, https://www.epa.nsw.gov.au/your-environment/waste/waste-overview/waste-performance-data, NSW EPA (2020), Data Quality Statement, https://www.qld.gov.au/__data/assets/pdf_file/0033/129669/recycling-waste-report-2019.pdf

Skip Bins

Mixed C&D waste from construction sites is delivered to processors in large part from skip bin collections. It is one of the more challenging C&D waste material streams to manage for recycling. Some operators estimate excavated material and fines make up around 30% of the volume in mixed waste C&D skip bins (Construction & Demolition Waste Status Report, Australian Government, 2011). Skip bins are utilised on building projects where there are space constraints and/or time constraints and/or insufficient volumes of different waste streams to justify the investment in multiple bin systems that would be required to source separate all C&D materials on site. This is especially the case for the vast majority of residential building sites. The degree to which source separation of materials within the bin hire industry is currently occurring is difficult to know. However, where there is the space and the facilities to do so; the market and waste levy drive the financial incentives to sort and recover high value materials such as metals, concrete, and soils, and avoid the cost of landfill disposal.

Supply Chain

Recycling Facilities

C&D waste recycling streams received by processing facilities are generally:

- Mixed waste including demolition materials, building site clean-up waste, and skip bin collected waste;
- Source separated concrete, brick, asphalt, timber, and plasterboard; and
- Excavated soils and aggregate.

C&D mixed waste material arrives at the processing facility and is generally separated into different material using specialised purpose-built sorting plant and equipment to then be further sorted, shredded, screened, and separated by density. The aim is to separate the waste into the following:

- Clean masonry fraction to meet the requirements of the Recovered Aggregates Resource Recovery Order;
- Clean soil to meet the Recovered Fines Resource Recovery Order;
- Ferrous and non-ferrous metals to be recycled by others;
- Wood suitable for reuse complying with the Compost or Mulch Resource Recovery Order or for use as alternative fuels in approved facilities;
- Other materials such as plasterboard, garden organics and cardboard for recycling by others;
- Mixed waste for further processing at other facilities or for landfill.

The typical percentage split of material produced from C&D mixed waste recycling process is:

- 35-45% soil;
- 20-30% masonry;
- 10-15% wood;
- 3-5% ferrous and non-ferrous metals;
- 1-2% other; and
- 15-25% residual waste destined for landfill.

Source separated concrete, brick and asphalt materials are recycled using crushing and screening equipment and the products produced are manufactured to the relevant Resource Recovery Orders. Ferrous and non-ferrous metal is separated for recycling by others during this process. Only a very small percentage of residual waste is produced when processing source separated concrete and brick (<0.1%).

The products produced are used in drainage works, behind retaining walls, electrical trenches, temporary ground cover on building sites, under concrete slabs, pipe backfill and in various landscaping applications. Many products are additionally manufactured to comply with specifications for Transport for NSW, Sydney Water Corporation, electricity supply utilities, and local councils, and as such are extensively used in road construction.

Excavated soils are typically processed at C&D recycling facilities via screening to produce recovered fines, masonry for subsequent crushing and screening to make recovered aggregates, and residual waste. Products include turf underlay, gardening mix, road base, engineered fill and void remediation for quarries and landfill sites.

The existing typical C&D recycling waste flows from waste generating sites to C&D recycling facilities and the typical recycling process flows within recycling facilities themselves Are shown in the figures at Appendix B

Products

Segregated C&D waste materials and products from processing facilities include:

- Crushed brick and/or concrete aggregates – used mainly for drainage type applications as well as temporary and access surfaces replacing virgin quarry products;
- Crushed brick and/or concrete sands and road bases – used for pipe laying backfill, bedding sands, paving bases and road construction sub-base, and base course layers replacing virgin quarry products; and
- Treated contaminated soils for use as engineering fill.

Mixed C&D waste materials and products from processing facilities include:

- Soils/fines for use as under turf as a subbase or fill;
- Timber for mulch and composting;
- Timber for alternate fuel (WWDF);
- Processed engineered fuels (RDF);
- Masonry for further processing by crushing into sands and aggregates as per the Segregated waste stream above;
- Gyprock for soil amendments; and
- Metals for further reprocessing.

Our October 2021 submission explained that based on data provided to the CIE by industry operators, waste facilities processed 2.9 million tonnes of C&D waste material. Through consultation with major mixed waste processors CIE estimated that recovered fines comprise 31% of input material on average, which results in the production of approximately 900,000 tonnes of recovered fines.

The quantity of soils processed under the recovered fines order is harder to determine, as some soil does not need to be processed, and therefore is classified as Excavated Natural Material (ENM). It is estimated that 300,000 tonnes of soil are currently processed under the recovered fines order and a further 25,000 tonnes of contaminated soils is processed under site specific arrangements.

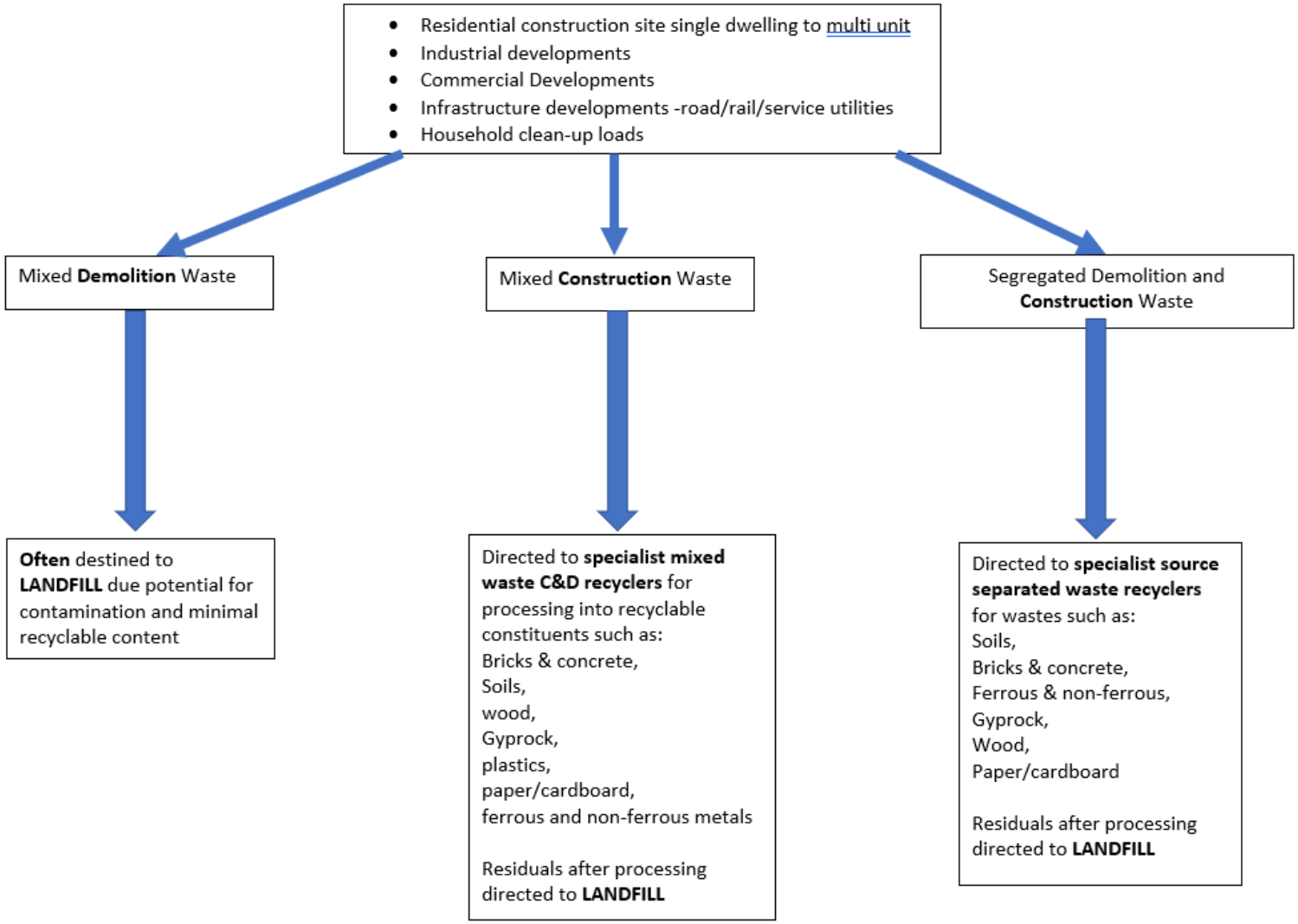
Recovered Fines Uses

The ability to receive waste material from construction sites across NSW and make recycled products for use in construction and landscaping is an important practice that has been integral to managing Sydney's construction costs and reducing reliance on diminishing scarce virgin materials (such as topsoil). As well as being the main process through which waste materials are diverted from landfill the C&D recycling industry has enabled recovery rates to remain at over 75% in NSW. As noted in NSW EPA's 2017 *Guidelines on resource recovery Orders and Exemptions: For the land application of waste materials as fill*, "fill materials are a valuable resource that play a pivotal role in the construction and infrastructure sectors, and are fundamental to the growth and prosperity of the NSW economy. The EPA encourages the recovery of resources from waste to be used as fill where this is beneficial and poses minimal risk of harm to the environment or human health."

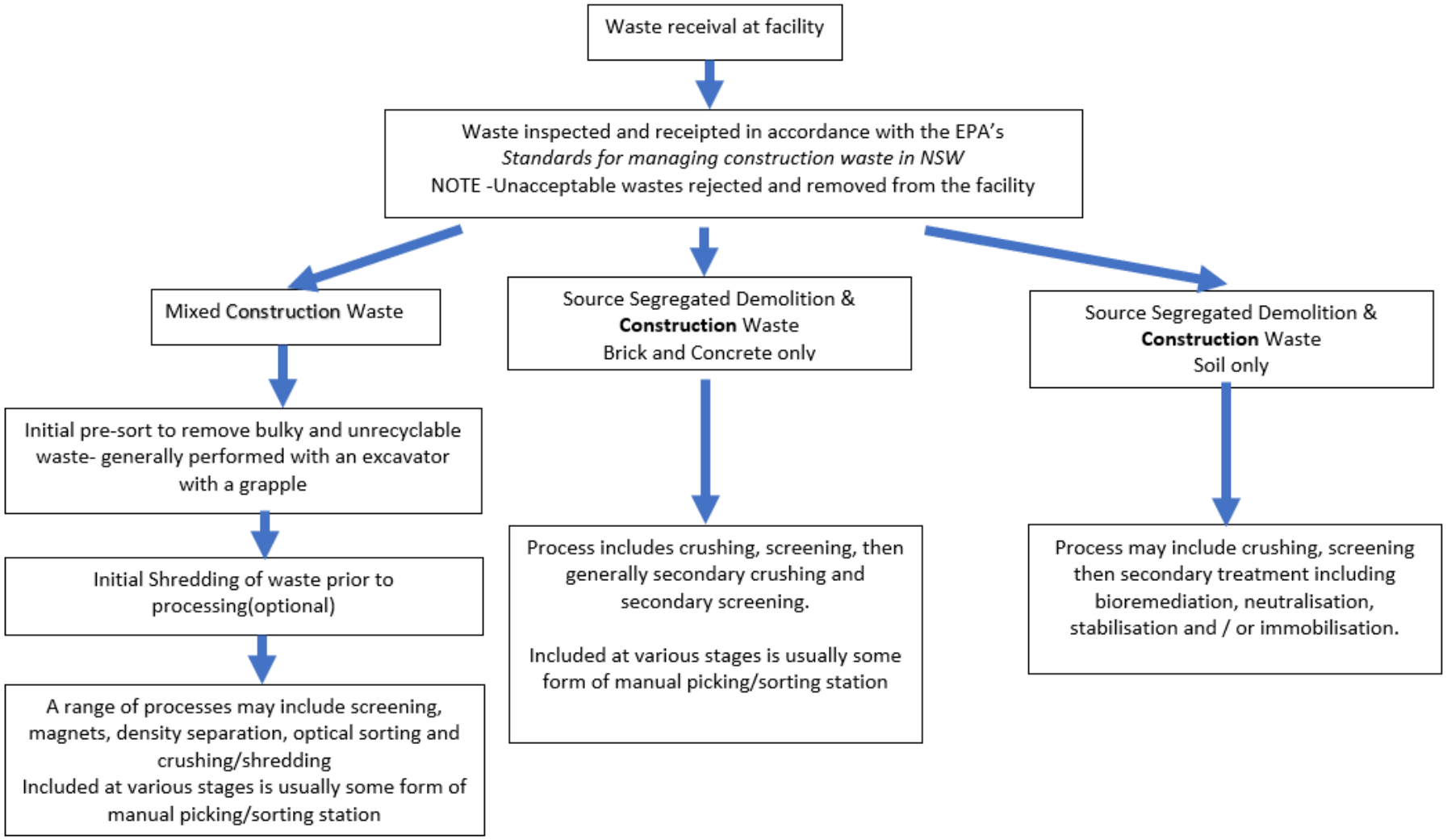
Typically, recovered fines from the processing of mixed C&D waste and soil are on sold to others (who blend and/or sell products for use) or directly to users by the processor. Recovered fines are primarily used in the following applications:

- Turf underlay and Landscaping: this is the most common application for recovered fines. Turf underlay consisting of recovered fines is typically marketed as a lower-cost form of underlay. Our understanding is that these products meet the definition of *earthworks* (described as filling to achieve the required topography) in the both the proposed recovered fines and soils exemptions. Our understanding is that these uses would meet the definition of earthworks in the draft orders.
- Road base: Combined with recovered aggregates to form a road base. This requires specific particle size mixes. This product would no longer be available under the proposed exemptions.
- Engineered fill: an uncommon application for recovered fines due to the potential compactability of timber and other inclusions and potentially no longer available under the proposed Exemption but this needs to be clarified. We note that the recovered soils order includes *engineering fill* as an approved use.
- Quarry and other void remediation: rehabilitation of former quarry or landfill sites can make use of recovered fines as a fill. Our understanding is that this product meets the definition of *earthworks*.
- Gardening mix: gardening mix usually provided by retailers not processors. It is a less common application for recovered fines, and typically only where the level of chemical contamination and inclusions is relatively low. Gardening mix can be used for growing plants other than turf, such as in garden beds. This product would no longer be available under the proposed changes.

Resource Recovery Process Flowchart 1 – How Waste Gets Sorted



Resource Recovery Process Flowchart 2 – How We Recycle Waste



Importance of C&D Waste to the circular economy

The recovery and recycling of C&D waste has a significant role in achieving circular economy outcomes.

Substitute for Virgin Materials

Materials produced by the C&D waste recycling industry provide substitutes for extracted materials through the reuse of, for example, tunnel and basement excavation spoil and recycled aggregate, concrete, bricks and tiles. In a report commissioned by the then NSW Department of Planning and Environment, *Construction materials for Sydney Region* (April 2019) these substitute construction materials are estimated to meet 46% of the industry's demand for sand and crushed rock products for subbase, road base and engineered fill. In 2018 the total demand in the Greater Sydney Region for construction related materials was 36.2Mt. Of this total, extractive materials equalled 19.5Mt and substitute materials equalled 16.7Mt. The report also predicted a continuation of the rising demand (36% from 2012-2018) for these materials due to increased demand in all sectors – housing, non-residential buildings, roads and other infrastructure. The majority of extractive sites are located outside the Sydney Region (all crushed rock and two thirds of sand facilities). In 2018 there were on average nearly 2,000 truckloads of extracted materials delivered in Sydney every day. The forecasted demand for substitute construction materials over 2018-2036 was 326Mt.

This demand trend will not only continue but is likely to increase, especially with post Covid 19 government stimulus and the State's infrastructure program. The proposed changes to the recovered fines and soils orders will significantly impact the unavailability of some substitute construction materials with the resulting shortfall leading to the need for further extraction of natural materials. This will be compounded by the increased truck movement from outside the greater Sydney region. There are also likely to be significant increases in cost for these materials due to scarcity, as well as the higher production and transportation costs from outside Sydney.

Markets and Uses for Recycled Products

The C&D recycling sector produces a suite of products for varying applications and as such has a number of markets for product sale and utilisation. The key markets include:

- Construction industry where recycled C&D materials are used for:
    - drainage;
    - temporary and access surfaces;
    - pipe laying backfill;
    - bedding sands;
    - paving bases;
    - road construction sub-base and base course layers; and
    - engineering fill.
- Landscaping industry where recovered fines are predominately used for turf underlay but also some of the above (note that some uses may no longer be available under the exemptions – see Clarifications and Ambiguities section below);
- Organics recycling industry providing timber for mulch and composting;
- Energy production industry:
    - Timber for substitute or supplementary fuel
    - Processed engineered fuels such as Refuse Derived Fuels
- Metals recycling industry;
- Retail landscape industry; and

- Horticulture industry via recycled gyprock for soil amendments.

In particular, the C&D recycled products are utilised by the construction industry as a substitute for virgin materials in road construction and subbase. As previously outlined, 16.7Mt of substitute construction materials were utilised by the construction industry in 2018. Of this 85% was utilised in road construction and major infrastructure projects. The Tier 1 contractors who construct NSW's major road networks and large infrastructure are, and will continue to be, a major market for the C&D recycling industry. Without cheaper substitute construction products from the C&D recycling industry located in closer proximity to the construction itself (as opposed to more distant mines and quarries), these large civil and infrastructure projects would cost more, take longer to construct and result in increased costs to the community.

Importance to the NSW Economy

The annual revenue based on the data for source separated and mixed C&D processing facilities (i.e., only the recycling operations and not the collections/transport component of the value chain) is around $500 million per year. This covers fewer material volumes than data on C&D published by NSW EPA, as EPA figures include virgin excavated natural material (VENM) and some C&D recycling would go to other facilities (such as metal recyclers or interstate).

The continued production of recovered fines is integral not only to the viability of the C&D recycling sector, but also the construction sector in NSW, which currently generates over $15 billion a year for the NSW economy.

Recycling Rates and Landfill Diversion Targets

The C&D recycling sector processes almost 60% of the total waste generated in NSW with a recycling rate of 76%. This demonstrates the importance of the industry in achieving the State government's 10-year diversion target of 80% for all waste streams (as outlined below), when both MSW (46%) and C&I (56%) waste diversion lag significantly behind C&D waste recycling.

Figure 1.5

Source: NSW Waste and Sustainable Materials Strategy 2041

The EPA's proposed changes to the resource recovery of fines and soils will reduce the ability of the C&D recycling industry to achieve higher diversion targets and it is highly unlikely the NSW diversion targets will be achieved. As identified in our October 2021 submission, CIE predicted the following outcomes:

- C&D mixed waste recovery rate will fall from 75% to 38%
- C&D waste recovery rate will fall from 76% to 65%
- The state-wide recovery rate will fall from 64% to 58%

Pressure on Landfills

To put the size of the impact in perspective, the initiatives and programmes proposed to achieve the state-wide reduction in Food Organics and Garden Organics (FOGO) being disposed to landfill are expected to recover around 400,000 tpa of organics. This diversion from landfill will be more than offset by increased C&D waste being disposed to landfill, which will be over 1 million tpa, if the industry is no longer viable.

The government through the WaSMS and its accompanying infrastructure guide recognised the need for alternatives to landfilling due to current and future capacity constraints. Landfill capacity and waste management infrastructure is also under increasing pressure as a result of more frequent and catastrophic events such as bush fires and floods. The flooding disasters that NSW is currently experiencing are impacting all metro waste transfer stations and landfills (including Woodlawn). Facilities have reached or are reaching capacity and are having to limit access and are turning way those wishing to dispose of commercial and industrial waste.

Strategic waste policy and regulation must also consider disaster waste management disposal and the proposed changes to recovered finds and soils orders and exemptions will result in more waste being disposed to landfill, compounding the capacity problem.

Implications of the Proposed Changes

Economic Impact

The industry is of the view that the current proposed changes to the orders and exemptions will result in less recycling, increased landfilling and will have a commensurate effect on the industry and jobs, especially in western Sydney and other high unemployment areas. As identified in our October 2020 submission and in the CIE economic impact assessment, it will also result in increased costs of $956 million for mixed C&D and $129 million for soil over 10 years to the building and construction sector and households (e.g., due to costs associated with landfill disposal and sourcing alternative products), undermine recycling rates and increase disposal to landfill. Given increased costs to waste generators, it is likely there will also be an increase in illegal dumping and its attendant environmental impacts, resulting in increased costs to both the state and local governments for clean-up. The economic impact of the proposed changes are details in the table below:

Table 1: Economic impact of proposed changes

Item	Mixed C&D waste, discounted	Soil, discounted
	$m, present value	$m, present value
NSW Government (waste levy)	1 053	344
C&D recyclers (lost producer surplus)	- 459	- 35
Construction businesses, demolition	-1 378	- 402
Material users	- 125	- 35
Environment/community	- 46	0
Total	**- 956**	**- 129**

Note: Over a ten year period using a discount rate of 7 per cent.

Source: The CIE.

The above estimates are based on central case assumptions detailed in the CIE Better Regulation Statement that was provided as an appendix to our October 2021 submission.

In summary, the proposed changes will lead to a net cost for the NSW community of $956 million over ten years, comprising:

- benefits to the NSW Government of $1,045 million in additional waste levy revenue;
- costs to mixed waste C&D recyclers of $445 million which includes $270 million related to existing stockpiles if implementation is done as planned. This could be avoided with a more considerate and reasonable transition period. It includes a loss of return on facilities and equipment developed to process mixed C&D waste;
- costs to the construction sector of $1,378 million for increased waste costs;
- cost to users of recycled materials of $125 million for higher material costs; and
- costs to the community of $46 million related to the part of waste that is anticipated to be transported to Queensland for processing (including GHG and air emissions, accidents and congestion).

As identified in the October 2021 submission the changes to the orders and exemptions will also result in changes to how the skip bin industry calculates charges. These are currently based on a cubic metre (m^3) basis on the assumption that a portion of the material will be recovered. In order to adequately cover increased disposal charges due to less material being recovered, skip bin operators will need to implement a price that includes an initial charge for the bin and transport, and a subsequent charge for disposal, based on actual weight. This will require equipment changes to all collection vehicles. The industry calculates the cost of retrofitting scales to collection vehicles to be around $7,000 per vehicle. There are an estimated 750 vehicles involved in skip bin services.

The implementation of weight-based charging will significantly and directly impact householders undertaking single home construction and renovations. The industry estimates a 160% increase to the cost of disposing building and construction waste for the average new home build. Due to increases in gate fees and waste levy charges the cost of waste disposal from these types of projects will increase from $1,500 to $3,900 per standard skip bin.

The viability of recycling mixed C&D wastes will become unprofitable due to the EPA's proposed changes. This will result in the loss of jobs predominantly in Western Sydney, estimated to be 398. An additional 102 jobs are forecast to be lost across the balance of Greater Sydney, resulting in a total loss of 500 jobs. This is a very poor outcome in terms of recycling, the economy for NSW, and the construction industry.

Summary Statement: **The changes to the recovered fines orders and exemptions will have a devastating impact of the C&D waste recycling industry and lead to the loss of 500 jobs. Costs for the building and construction sector and households will increase $956 million for mixed C&D waste and $129 million for soils over 10 years, recycling rates will be undermined, and illegal dumping will increase. The proposed changes will also have a direct effect on costs for new single home builds for households, increasing the average skip bin waste disposal charge by 160%.**

Recycling Rates and Landfill Diversion

NSW has adopted the National Waste Policy Action Plan targets of reducing total waste generated by 10% per person by 2030 and an 80% average recovery rate from all waste streams by 2030. Further to this, NSW has an interim target of 80% for C&D waste by 2020 (currently 76%). The changes to the recovered fines order and exemption would seriously undermine the ability to reach these targets and the outcomes would be detrimental to the stated aims and objectives of the *NSW Government WaSMS* and *NSW EPA Waste Delivery Plan*. Revoking these orders will effectively diminish NSW's ability to

reach the resource recovery targets the government has adopted and before the intended upstream changes to waste generation that will improve the quality and quantity of waste have been introduced. As we identified in our October 2021 submission, based on work by CIE we commissioned it is estimated that the proposed changes will result in the *NSW Waste and Sustainable Materials Strategy 2041* resource recovery targets not being met due to:

- a reduction in the mixed C&D waste recycling rate from 75% to 38%;
- a reduction in the C&D recycling rate from 76% to 65%; and
- a reduction in the overall NSW recycling rate from 64% to 58% – the target is 80 per cent.

The changes will lead to an increase in material disposed to NSW landfills of around one (1) million tonnes per year. This is in addition to current C&D landfilling of three (3) million tonnes per year in NSW. This is more than twice the amount that could be diverted from landfill by rolling out FOGO to households and targeted businesses across NSW. The efforts to reduce organics disposal will be completely offset by the increase in C&D waste disposal.

Summary Statement: The NSW government targets for resource recovery will not be achieved as a direct result of the proposed recovered fines and soils orders. Further, the changes will undermine the landfill diversion gains made by mandating FOGO separation and collection.

Landfill Capacity

Across NSW, three million tonnes of C&D material are landfilled each year. The EPA's proposed regulatory changes will lead to approximately one million additional tonnes of C&D material being landfilled each year. This will stretch greater Sydney landfill capacity, which is expected to be reached currently in 2028, and would instead by reached in 2026. This would increase the risk of new capacity being planned and delivered in time, and any new capacity would likely be more distant and at higher cost. The increasing scarcity of landfill space will drive up disposal costs, and consequently apply further pressure to more distant landfills, increasing transportation costs and the environmental and social impacts associated with more vehicles on the road for longer distances.

The costs associated with the proposed changes will likely result in commercial decisions that it is not sustainable to process and beneficially reuse recovered fines and consequently the viability of recycling mixed C&D wastes is seriously jeopardised and will be unprofitable. As mentioned above, this will result in the loss of an estimated 398 jobs, predominantly in Western Sydney. An additional 102 jobs are forecast to be lost across the balance of Greater Sydney, resulting in a total loss of 500 jobs. This is a very poor outcome both in terms of recycling, the building and construction industry and the NSW economy.

Summary Statement: The proposed changes to orders and exemptions will result in an estimated additional 1 million tonnes of C&D material landfilled each year and estimated total job loss of 500 and an estimated 398 in Western Sydney.

Illegal Dumping

The increase in pricing for the disposal of C&D waste resulting from the proposed changes will likely result in an increase in illegal dumping.

As we indicated in our October 2021 submission, in a 2007 study[2] MMA and BDA Group undertook an empirical analysis of illegal dumping in the state of South Australia drawing on a Local Government

[2] MMA and BDA 2007, *South Australia's Waste Strategy 2005-10: Ex-ante Benefit Cost Assessment*,

Association baseline study of illegal dumping incidents. It was estimated that the extent of illegal dumping was sensitive to legal disposal costs, with a cross-price elasticity of around 2. That is, if the price of legal disposal increased by 50 per cent, the amount of illegal dumping would double. The EPA's proposed changes are likely to result in a much more substantial increase than 50 per cent. Some skip bin companies have indicated an increase in prices of 8-10 or more times current rates and processors have indicated that costs for testing alone will double compared to current costs and this will be reflected in increased collection (skip bins), processing and disposal prices to consumers. Increased costs to consumers will lead to increased dumping.

We noted in our previous submission that MMA and BDA also found that total illegal dumping volume was about 1 per cent of the landfill amount, and about 10 per cent was C&D waste. Applying those findings would result in around 8,000 tonnes more illegal dumping in NSW. Note that the amount may be higher in NSW given the much higher landfill disposal fees than South Australia and the higher rates of building and infrastructure development currently occurring and planned for the future.

Summary Statement: Due to increased disposal costs, it is estimated that at least an additional 8,000 tonnes of C&D waste will be illegal dumped in NSW adding costs for state agencies and local government for clean-up and undermining the gains made through Regional Illegal Dumping Squad activities and the EPA's Waste Crime Taskforce in deterring such practices.

Defunct Investment

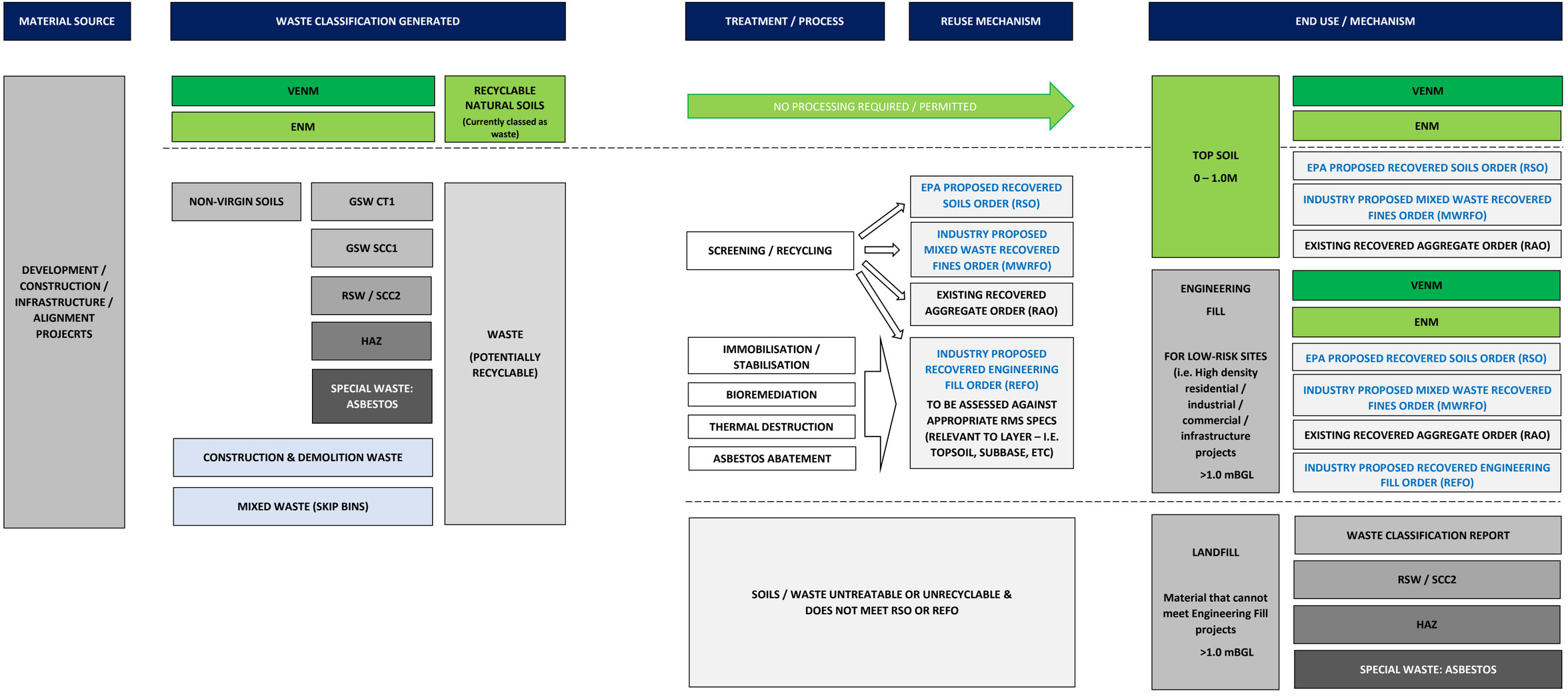
To implement the Standards the industry has invested in new technology and infrastructure for example smaller screen sizes to produce a finer product and dedicated sorting plants. Improvements have also been made to control systems for load assessments and employee training on asbestos awareness and identification in order to improve the detection of contaminates in material received at processing facilities and undertake actions to address it. The industry has invested around $37 million in capital expenditure from 2019-2020 to improve performance and achieve the new Standards. These are now sunk costs that cannot be realised if the proposed changes go ahead, and the investment will go to waste if the industry collapses.

Many facility operators have invested large amounts of capital based on the existing Resource Recovery Orders and Exemptions requirements. For example, one major company has invested $30 million dollars on a dedicated mixed C&D waste processing facility designed to meet the current recovered fines orders. This entire facility is now in jeopardy. This undermines industry confidence and the incentive to invest in recycling infrastructure in NSW will substantially reduce. This is also counter to the NSW government's stated intention of increasing investment in waste and recycling infrastructure and undermines the objects of the government's WaSMS and the EPA's own Waste Delivery Plan.

Summary Statement: **The industry has in good faith undertaken significant investment in technology, equipment, systems and staff skilling to improve performance and meet the new Standards and the requirements that apply under the current recovered fines orders and exemptions. This investment will still have to be paid for and there is a real likelihood of stranded assets as a result of the proposal to revoke the orders.**

Transition Timeline

PROPOSED REVISED WASTE CLASSIFCATION / RESOURCE RECOVERY RESPONSE STRATEGY



FOLLOWING RESOURCE RECOVERY ORDERS REPLACED BY RECOVERED SOILS ORDER AND RECOVERED ENGINEERING FILL ORDER:

RECOVERED FINES ORDER (CONTINUOUS)

EXCAVATED PUBLIC ROAD MATERIAL ORDER

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED