Roads to Reuse

Product Specification – recycled road base and recycled drainage rock

GOVERNMENT OF WESTERN AUSTRALIA

WASTE AUTHORITY
WA...TOO GOOD TO WASTE

WasteSorted
A Waste Authority Program

March 2021

This March 2021 version replaces the previous version published in June 2020.
This version contains revisions to Sections 2 and 4.3, and Appendix 1.
No other content has been changed.

NOTE

- This document sets out product specification for recycled road base and recycled drainage rock.
- Roads to Reuse (RtR) incentive payments will only be made for product which meets this product specification.
- Producers claiming to meet this product specification must allow independent auditors to audit products and procedures in accordance with this specification, regardless of whether or not RtR incentive payments are made in relation to the product.
- Material meeting this specification will no longer be considered a waste for the purposes of the waste levy.
- Licence conditions for sites must be met, and are not superseded by this specification.
- The Waste Authority may make decisions in relation to this specification as part of its role in delivering the RtR.

1. Application

Waste-derived construction products are typically produced from construction and demolition (C&D) waste – that is materials in the waste stream which arise from construction, refurbishment or demolition activities.

Depending on the source of the waste and the previous use(s) of the source site, C&D waste may include other contaminants such as pesticides, asbestos and heavy metals. Some of these contaminants may be identified through a visual inspection of the waste or through odours given off by the waste. Many chemical contaminants may not be readily identifiable through visual inspections or odour checks.

2. Authorised product use

This product specification provides for the use of recycled road base and recycled drainage rock by end users as detailed in Table 1 below.

Table 1: Recycled construction product applications

Product	Authorised use
Recycled road base	As sub base or base course in road and pavement construction and other hardstand areas such as footpaths and car parks for urban residential, public open space and commercial and industrial land uses only.
Recycled drainage rock	As pipe bedding in underground projects for urban residential, public open space and commercial and industrial land uses only. As drainage rock in civil drainage infrastructure.

It is an end user's responsibility to ensure that use of recycled road base and recycled drainage rock complies with the user's obligations under any written law and the general law.

Please see Appendix 1, Table 3 for further restrictions relating to surface and groundwater protection.

3. Operational control procedures

This section sets out the operational control procedures that must be adopted by producers at sites producing recycled road base and recycled drainage rock from C&D waste to support the achievement of the product specification.

These operational control procedures are not intended to set out requirements in relation to occupational health and safety issues associated with the production of these recycled construction products from C&D waste. Producers should ensure they are aware of their responsibilities under occupational health and safety legislation and implement appropriate controls to protect their employees and other persons such as visitors to the premises.

Producers should ensure they are compliant with requirements under licence conditions, including the requirement for an asbestos management plan, outlined in the Departmentof Water and Environmental Regulation (DWER) document *Guidelines for managing asbestos at construction and demolition waste recycling facilities*[1]. Producers should also consult this guideline for detailed information on pre-acceptance and acceptance procedures, as well as load inspection after acceptance procedures.

Producers should ensure operational control and acceptance procedures are detailed in their Material Acceptance and Sampling Plan (MASP).

1 www.der.wa.gov.au/images/documents/our-services/approvals-and-licences/final-guidelines-asbestos-in-cd-recycling--version-1.pdf

3.1. Pre-acceptance procedures

Prior to accepting C&D waste for the production of recycled road base or recycled drainage rock, producers must seek as much information as possible on the source of the C&D waste including:

- the source site of the waste
- the current and previous use/s of the source site (sites with contaminating land uses such as petrol stations may require additional testing. Potentially contaminating land uses are listed in the Department's *Assessment and management of contaminated sites* (2014))
- the location of the previous site, and the age of any buildings or structures (age of structures can be an indicator of asbestos risk)
- whether the source site is classified as a contaminated site
- any known contamination of the source site or waste
- types of materials contained in the load.

This information must be used to determine the extent of product sampling and testing as detailed in Section 4.

Producers must:

- advise all customers and potential customers that asbestos or potentially asbestos contaminated material is not accepted at the C&D recycling facility during telephone enquiries and through information included on other documentation such as price lists, brochures and the company website
- ensure a 'no asbestos' clause is included in any contracts with C&D waste suppliers
- install a clearly visible sign saying "No Asbestos" at the entry to the facility
- establish a system to record the details of loads arriving/received at the site which have been found to contain asbestos.

3.2. Acceptance procedures

When waste arrives at the recycling facility, acceptance procedures must serve to confirm that the characteristics of the waste are consistent with the waste types permitted by the Part V licence and to determine the risk of the load containing asbestos.

To follow on from the pre-acceptance procedures, all persons bringing waste onto the premises must be asked to sign a declaration or provide a 'customer warranty' on a vehicle load specific basis confirming that their load is free from asbestos. The associated documentation should be retained on the premises and be available for DWER to inspect. Where an individual is not prepared to sign this disclaimer or provide such a warranty the load shall be refused entry.

All loads of C&D waste destined for use in the production of recycled road base and/or recycled drainage rock must be inspected and checked as outlined in Figure 1 to identify whether any of the following grounds for suspecting contamination exist:

- discolouration of the waste
- the presence of hydrocarbon staining
- the presence of asbestos containing materials
- the presence of odours that would indicate that acid sulfate soil or other contaminants are present in the waste
- the presence of non-permitted waste.

Producers should ensure a thorough inspection is undertaken to enable a comprehensive visual and odour check of the material to be undertaken. It is advised that loads should be dampened during inspection, while asbestos risk is determined. *Guidelines for managing asbestos at construction and demolition waste recycling facilities* should be referred to for advice on how to treat low and high asbestos risk loads.

When an inspection and odour check identifies the potential contamination of a load with non-permitted waste (defined in Section 6) only, the load must be sorted to remove the non-permitted waste before it can be incorporated into recycled road base or recycled drainage rock.

When an inspection and odour check identifies other potential contamination (other than those listed in Appendix 1) of a load, the load must not be used to produce recycled road base or recycled drainage rock until the potentially contaminated waste has been isolated from the rest of the load.

When potentially contaminated waste is isolated from a load, the remainder of the load can be used to produce recycled road base or recycled drainage rock. The potentially contaminated waste should be tested to determine whether it meets the product specification. If it does not meet specification, it must be disposed of at a facility authorised to accept it. The potentially contaminated waste must not be used to produce recycled road base or recycled drainage rock until test results have confirmed it is suitable for inclusion in the production process. All sampling and testing must take place in accordance with Section 4.

Producers should ensure operational control and acceptance procedures are detailed in the MASP.

3.3. Waste processing controls

Once C&D waste has been inspected and dealt with by a producer in accordance with Section 3.2, operators must continue to undertake inspections and odour checks of the waste at all stages of their production process. Suspected contamination identified at any stage of the process must be handled in accordance with Section 3.2.

Producers must manage the size of their stockpiles of C&D waste such that they can clearly demonstrate that the sampling frequencies set out in Section 4.1 of this document, or where approved, the reduced sampling frequencies in Section 4.2 are being met. To facilitate compliance with this requirement, it is recommended that the size of each stockpile does not exceed 4000 tonnes (approximately 2900 m^3).

Blending of materials to produce recycled road base and recycled drainage rock is permitted providing each of the streams being blended meets the product specification. This means that sampling and testing of the different streams of materials to be blended must take place prior to the blending activity being undertaken. Producers must not use clean materials to dilute contamination levels in other wastes.

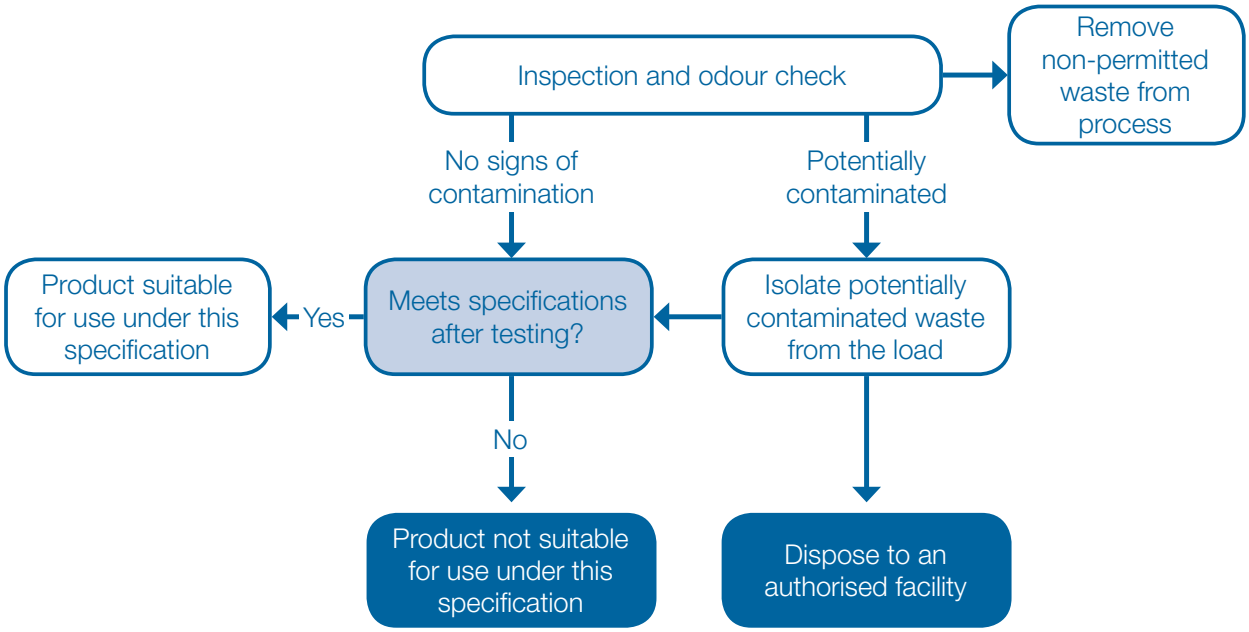

Figure 1: Acceptance procedures: construction products after pre-acceptance

4. Product sampling and testing

To ensure that recycled road base and recycled drainage rock have been produced to the required product specification, it is necessary for product testing to be undertaken by producers as detailed below.

► *Sampling standards and personnel qualifications*

Sampling must be conducted in accordance with Australian Standard 1141.3.1: Methods for sampling and testing aggregates.

Sampling must be conducted by a suitably trained person and samples should be stored and tested in accordance with the DWER *Assessment and management of contaminated sites* (2014)[2] guideline and the references therein to ensure that data obtained are accurate and representative.

Sampling and testing of recycled road base and recycled drainage rock must be undertaken in accordance with the following sections.

► *Conveyor vs Stockpile preference*

Sampling from conveyors, or from the end of processing prior to stockpiling, is the preferred sampling method to obtain effective results in a cost-effective manner.

In circumstances where legacy stockpiles of recycled material exist, sampling of these stockpiles should be undertaken as outlined in this document.

Stockpile sampling should only be conducted where conveyor sampling is not possible or appropriate, for the purposes of this funding program. If stockpile sampling is proposed instead of conveyor sampling, justification for this should be provided in the MASP.

► *Sampling purpose (overall suitability and variance considerations)*

Samples should be collected to analyse overall average chemical suitability of material, as well as variance within material. Overall quality can be assessed by collecting samples from various sections of the stockpile, or at various intervals from a stopped conveyor belt. Collection can be based on several methods, including random, systematic, stratified, and/or composite depending on the circumstances and site conditions. The National Environmental Protection (Assessment of Site Contamination) Measure 1999, Schedule B2, section 5 and 6 should be consulted before selecting the most appropriate sample collection model. Variance can be assessed by subsampling at various locations within a stockpile, or stopped conveyor belt. Justification for the selection of samples for overall quality and variance should be provided in the MASP. A MASP must be submitted for approval before sampling is undertaken. The plan will outline sampling locations, sampling methods, amount and types of samples to be collected, and other relevant information, as well as justification for why these options were selected.

2 www.der.wa.gov.au/images/documents/your-environment/contaminated-sites/guidelines/Assessment_and_management_of_contaminated_sites.pdf

4.1. Routine frequency sampling

4.1.1. Conveyor Belt

When sampling from conveyors, samples should be collected from a stopped conveyor belt. For health and safety purposes, no sampling should take place when a conveyor belt, or associated machinery, is moving. Samples and subsamples should be collected in accordance with the MASP.

When routine sampling is carried out from conveyors, discrete samples must be collected from the conveyor belt line at the frequency of one sample per 140 m^3 of material, or 20 samples per 4000 tonnes. The MASP should consider this frequency, and also consider how subsampling will interact with this frequency. In some cases, samples may exceed this frequency in order to accommodate subsamples.

Additional samples must be taken where an inspection and/or odour check has identified evidence of potential contamination. A written record of the volume of potentially contaminated material and the number of additional samples taken should be made and retained on the site.

A minimum and maximum averaging interval should be specified in the MASP. For example, additional samples should not be taken to attempt to reduce the average contaminant concentration in a tested volume of material, nor should the volume of material be increased in an attempt to dilute average contaminant levels. Intervals should be expressed in the MASP and adhered to.

4.1.2. Stockpiles

When sampling is carried out from stockpiles, the most appropriate collection method must be selected, based on the conditions of the site and the stockpile. Health and safety of personnel should be a key consideration when selecting the sampling method.

Sampling should be conducted by the most appropriate method from the following list. Australian Standard 1141.3.1 should be consulted to understand each sampling method.

- Hand sampling
  - hand sampling with a shovel or a scoop from the top of a trimmed stockpile
  - hand sampling from the sides of a stockpile
  - use of sampling tubes (size of material particles should be considered before selecting this method)
- Sampling aided by power equipment
  - sampling by costeaning
  - sampling using backblading

Further information on sampling techniques can be found in the Cement *Concrete & Aggregates Australia Guidelines to Sampling for the Extractive Industry* (2006). The guidelines provide a quick reference guide for the most appropriate sampling methods for different circumstances, as well as providing detail on advantages and disadvantages of sampling methods. Methods for sample collection, and reference to the guideline and/or Australian Standard must be outlined and justified in the MASP.

Samples must be collected from stockpiles of recycled road base and recycled drainage rock at a rate of 20 samples per 4000 tonnes or seven samples per 1000 m^3 of material or parts thereof. For small stockpiles under 100 m^3, a minimum of three samples per stockpile is required.

Additional samples must be taken where an inspection and/or odour check has identified evidence of potential contamination. The number of additional samples must be proportionate to the volume

of potentially contaminated material within the stockpile. A written record of the volume of potentially contaminated material and the number of additional samples taken should be made and retained on the site.

4.2. Reduced frequency routine sampling

Once producers have demonstrated to the Waste Authority that their procedures are able to produce recycled road base and/or recycled drainage rock, which consistently meets the product specification and that they undertake their activities to an acceptable standard, they may be eligible for a reduced routine sampling rate of five samples per 4000 tonnes (or one sample per 600 m^3) of material.

The following criteria will be used to determine whether a reduction in routine sampling requirements is warranted:

- whether the producer's procedures for the production of recycled road base and/or recycled drainage rock have been validated as being compliant with this product specification to the satisfaction of the Waste Authority, and following inspection, routine sampling has demonstrated to the satisfaction of the Waste Authority that the product specification has been consistently achieved by the producer for a continuous six-month period
- whether, in the Waste Authority's estimation, a representative quantity and range of wastes have been processed in the six months of product testing carried out
- whether assessed activities represent standard business for the producer in terms of throughput.

All requests for a reduced routine sampling rate must be submitted in writing supported by evidence addressing the above criteria.

The Waste Authority will advise a producer in writing when a reduced routine sampling rate has been determined to be appropriate for the purposes of program funding. Producers will be required to continue to monitor compliance of their operational procedures with this product specification.

Monitoring of these procedures will be further supported by the annual process audits required by Section 4.4 and the results of the product sampling.

Material eligibility for program funding based on a reduced routine sampling rate may be withdrawn where non-compliance with this product specification is identified. Where the eligibility of a reduced routine sampling rate is withdrawn, the producer will be provided with reasons for the withdrawal.

In the event that the eligibility of a reduced routine sampling rate is withdrawn, the producer will only be granted eligibility for a reduced routine sampling rate if the producer makes a new reduced routine sampling rate request and demonstrates to the Waste Authority that it has:

- implemented appropriate measures to prevent a re-occurrence of the non-compliance(s) that caused the previous approval for a reduced routine sampling rate to be withdrawn
- ensured that routine sampling at the non-reduced rate of 20 samples per 4000 tonnes or parts thereof of material for stockpiles and one sample per 140 m^3 of material for conveyors has demonstrated that the product specification has been consistently achieved by the producer for a continuous six-month period following the implementation of the measures identified in point 1 above.

4.3. Sample analysis and interpreting results

Observation and testing for asbestos and interpretation of results must be done in accordance with existing guidance referenced in Appendix 1 and outlined in the MASP.

For other parameters, all samples must be submitted to, and tested by, a laboratory with current National Association of Testing Authorities (NATA) accreditation for the parameter being measured. Laboratory limits of detection must be below the product specification limit for that parameter.

All samples must be tested for the attributes listed in Appendix 1 depending on their composition and intended use.

Laboratory analysis should be conducted in a way that tests a representative sample of the entire mass provided. For example, fines should not be isolated and used solely for digestion and other sample preparations. Sufficient crushing or milling should be undertaken to yield a mostly homogenous material that can be representatively sub-sampled at low volumes (for example, <2 g sub-sample). A suggested laboratory sample preparation method to achieve this is outlined below:

- isolate suitably large subsample representative of the bulk sample
- crush/pulverise subsample sufficient to allow sample to pass through a 2 mm sieve
- strong acid digest conducted (followed by analysis) as an estimate of total available metals (noting not 100 per cent total digest).

Note that uncrushed sample should be retained in case leach testing or repeat testing is required.

This is the preferred sample preparation method. Should an alternative method be proposed by a producer, this should be outlined, detailed, and justified within the MASP. Any alternate methods should be supported by advice from a NATA accredited laboratory.

Producers can obtain information about the source site of C&D waste accepted at its site for the production of recycled road base or recycled drainage rock, which identifies a previous use or a contaminated site classification. This can indicate contaminants (including those which may emit electromagnetic radiation) may be present in the C&D waste, which requires additional testing of the products produced from these loads.

The department's guideline for *Assessment and management of contaminated sites* (2014) identifies common contaminant types that may be present as a result of a previous land use or potentially contaminating activity.

When waste arising from a site, with a previous land use referred to in the guideline, is used to produce recycled road base or recycled drainage rock, the recycled construction products must also be tested for any contaminants of concern relating to previous land use. Such contaminants are identified in the guideline for the previous land use in addition to the parameters included in Appendix 1.

Laboratory analytical reports must include:

- a statement of the limit of detection of the analysis undertaken for each parameter in Appendix 1 (and any additional parameters identified)
- the concentration of each parameter in each sample using the relevant units specified in Appendix 1 (and any additional parameters identified)
- quality assurance/quality control (QA/QC) protocols and results, consistent with reporting requirements in the relevant sections of the guideline
- a detailed description of sample preparation used prior to analysis.

Once results are obtained, basic statistical analysis should be undertaken including: minimum; maximum; mean; median; standard deviation; and 95 per cent upper confidence limit (of the mean) to assess the material, in accordance with the MASP. Arithmetic mean should be compared with 'maximum average concentration' values in Table 3[3]:

When testing for parameters other than those set out in Appendix 1 is required, a qualified person must assess the results. This is to determine whether any chemicals or substances other than those referred to in Appendix 1 present an unacceptable risk of harm to human health or the environment if it is employed for the authorised product uses in Section 2. The qualified person must document their determination in writing together with evidence of their qualifications as a qualified person. The producer of the sampled material must retain this documentation.

If the qualified person determines that the use of the contaminated material would constitute an unacceptable risk of harm to human health or the environment, the material must not be used for any of the uses set out in Section 2.

A stockpile or conveyor load of recycled road base or recycled drainage rock will only be considered to have met the product specification set out in this product specification if:

a) testing carried out in accordance with Section 4 shows that the sample from the stockpile or conveyor load does not contain non-permitted wastes in excess of the limits imposed under Appendix 1

b) laboratory analysis (not including original results where repeated sampling was undertaken in accordance with this section) identifies that all parameters referred to in Appendix 1 are within the product specification limits for all samples from the stockpile or conveyor load

c) any chemical or substance other than those referred to in Appendix 1 found to be present in the stockpile or conveyor load has been determined by a qualified person not to present an unacceptable risk of harm to human health or the environment.

4.4. Management and audit

Producers must develop and implement documented procedures and/or work instructions for their employees to ensure that they comply with this product specification.

A producer must arrange for a qualified person who is not involved in the day-to-day operations of its site to audit its compliance with this product specification at least annually and produce an audit report. A qualified person may be a member of staff from a similar site, a consultant or a representative of an appropriate industry body who otherwise meets the criteria set out in the definition of 'qualified person'.

A producer claiming to meet this product specification must allow independent auditors to audit products and procedures in accordance with this specification, regardless of whether or not RtR incentive payments are made in relation to the product.

Audits must address:

- whether the producer's procedures for the production of recycled road base and/or recycled drainage rock comply with this product specification

3 Averaging and statistical interpretation will not apply to analytical limits in Table 2. This is due to potentially environmentally sensitive applications for non-concrete containing materials.

- whether the producer's recycled road base and/or recycled drainage rock complies with the specifications in this product specification
- the effectiveness and implementation of the producer's operational control procedures
- the effectiveness and results of the producer's product testing
- the producer's retention of relevant records and documents.

A producer must maintain copies of audit reports so that they can be produced for inspection upon request.

5. Recordkeeping

Records are an important aspect of site operations and there should be a clear and logical system for keeping records at all premises. The following records must be retained by producers for a period of five years:

- details of all waste used to produce recycled road base and/or recycled drainage rock, including the type and quantity and all information obtained at the pre-acceptance stage as required by Section 3.1
- documentation associated with the inspection, sampling and testing of waste and recycled road base and/or drainage rock
- written determinations made by qualified personnel (including evidence of their qualifications as a qualified person) when testing for parameters other than those set out in Appendix 1
- audit reports.

The records maintained by a producer should be adequate to enable waste accepted by a producer to be tracked from its source site. The producer should also keep records of the supply of the recycled construction product to an end user.

A producer must maintain copies of the records referred to above in electronic or hard copy form so that they can be produced for inspection upon request.

6. Definitions

acid sulfate soil means naturally occurring soil and sediments containing iron sulfides that, when exposed to air, react with water and oxygen to produce a variety of iron compounds and sulfuric acid.

asbestos has the same meaning as it has in regulation Part 1 of the *Health (Asbestos) Regulations 1992*.

authorised use means a use set out in Section 2.

construction and demolition waste (C&D waste) has the same meaning as it has in the L*andfill Waste Classification and Waste Definitions 1996* published by the Chief Executive Officer of the Department of Water and Environmental Regulation as amended from time to time.

contaminated, in relation to C&D waste, means:

(a) having non-permitted waste in the C&D waste;

(b) having more than the allowed limits of the chemicals and other substances referred to in Appendix 1 of this product specification

(c) having chemicals or substances other than those referred to in Appendix 1 that present or have the potential to present, a risk of harm to human health or the environment and contamination in relation to C&D waste has a corresponding meaning.

contaminated, in relation to land, water or a site, has the same meaning as it has in section 4(1) of the *Contaminated Sites Act 2003* and **contamination**, in relation to land, water or a site, has a corresponding meaning.

day-to-day operations means the management of staff and the application of operational procedures and/or work instructions used on a site to meet the requirements of this product specification.

discrete sample means a sample collected and analysed individually.

end user means a person or entity that uses recycled construction products.

non-permitted waste means any waste other than that permitted to be in recycled road base or recycled drainage rock by Appendix 1 of this product specification.

producer means a person or entity that processes, mixes, blends or otherwise incorporates C&D waste into recycled construction products.

public drinking water source area (PDWSA) means the area from which water is captured to supply drinking water. It includes all underground water pollution control areas, catchment areas and water reserves constituted under the Metropolitan Water Supply, Sewerage, and *Drainage Act 1909* or the *Country Areas Water Supply Act 1947*.

- **priority 1, 2 or 3** area means three different priority areas assigned within PDWSAs to guide land use decisions. The objective of priority 1 (P1) areas is risk avoidance, priority 2 (P2) areas is risk minimisation and priority 3 (P3) areas is risk management.
- **reservoir protection zone (RPZ)** means a buffer measured from the high water mark of a drinking water reservoir, and inclusive of the reservoir (usually 2 km). This is referred to as a prohibited zone under the Metropolitan *Water Supply, Sewerage, and Drainage Act By-laws 1981*.
- **wellhead protection zone (WHPZ)** means an area usually declared around wellheads in public drinking water source areas to protect the groundwater from immediate contamination risks.

qualified person for the purposes of auditing means a person possessing relevant tertiary qualifications to a minimum bachelor level, with qualifications relating to auditing, and with a minimum five years' experience in conducting audits.

qualified person for the purposes of risk assessment, preparation of MASP, and interpretation of results means a person possessing relevant tertiary qualifications to a minimum bachelor level, such as in environmental science or environmental engineering, with a minimum of five years' experience in analysing laboratory results related to contaminated sites, or extractive industry testing, and:

- a certified practitioner (a person holding a 'Site Contamination' specialist certification under the Certified Environmental Practitioners Scheme)
- an accredited contaminated sites auditor

recovered glass means glass which is not contaminated and is recovered from source-separated glass recycling streams or screened and refined glass streams. It excludes:

- glass that contains lead oxide as a flux
- glass from Cathode Ray Tubes or other glass recovered from electrical equipment, or fluorescent or incandescent lights.

recycled drainage rock means a uniformly blended mixture of coarse grained aggregate typically between 20 and 27 mm in particle size consisting of a mixture of rock, brick and other similar rubble material produced from the crushing and screening of C&D waste. This material does not contain concrete.

recycled road base means a uniformly blended mixture of coarse and fine aggregate typically less than 19 mm in particle size consisting largely of concrete produced from the crushing and screening of C&D waste.

routine sampling means sampling and testing that is conducted on a regular basis.

screened and refined glass means the glass recovered from crushed and screened glass streams from materials recovery facilities.

waste has the same meaning as it has in section 3(1) of the *Environmental Protection Act 1986* and section 3(1) of the *Waste Avoidance and Resource Recovery Act 2007*.

watercourse has the same meaning as it has in the *Rights in Water and Irrigation Act 1914*.

wetland has the same meaning as it has in Schedule 5 to the *Environmental Protection Act 1986*.

Appendix 1: Product Specification

Subject to the qualifications in this Appendix, recycled road base may consist only of:

- concrete
- bricks
- tiles
- ceramics
- asphalt
- natural rock
- sand
- recovered glass.

In order to achieve pH criteria, drainage rock materials should not contain concrete. Recycled road base or recycled drainage rock product must:

a) meet the definition of recycled road base or recycled drainage rock respectively, as set out in Section 6 of this product specification

b) not exceed the limits of road base or drainage rock not containing concrete listed in Table 2, and recycled road base containing concrete listed in Table 3 (once prescribed statistical analysis and interpretation have been applied)

c) not contain any acid sulfate soils or copper chrome arsenate treated timber

d) not exceed a combined total of 2.5 per cent of other C&D wastes (apart from concrete, bricks, tiles, ceramics, asphalt, natural rock, sand and recovered glass), specifically low-density materials and organic matter.

   In addition, recycled road base or recycled drainage rock product must comply with applicable engineering specifications for percentages of “other C&D wastes”. Overall percentages must take into consideration the distinction between low-density material and organic material, and individual percentages of these materials must not exceed those outlined in relevant engineering specifications.

   Methods used to determine the percentage of other waste within recycled road base or recycled drainage rock must comply with Main Roads WA test method 144.1 (or other comparable methods depending on the user/application).

   The selected engineering specifications should relate to the user and use environment, including the class of material required for different constructions.

   Relevant engineering specifications may include:

   - IPWEA/WALGA Specification for the supply of recycled road base
   - Main Roads Western Australia, Specification 501: Pavements (any future amendments or iterations of this specification will also be applicable and should be considered by the producer)

Table 2: Non-concrete-containing recycled road base and recycled drainage rock product specifications (pH 6-9)

	Drainage Rock / Road BaseSealed Under Asphalt
Attributes	Limit[1] (mg/kg dry weight)
Metals	
Arsenic	20
Cadmium	1
Total chromium	75
Copper	100
Lead	200
Mercury	1
Nickel	60
Zinc	200
Hydrocarbons[2]	
Benzene	1
Toluene	50
Ethyl benzene	100
Xylene (total)	180
Total recoverable hydrocarbons (C6-C10)	100
Total recoverable hydrocarbons (C10-C36)	420
Polycyclic aromatic hydrocarbons (PAH)	40
Other	
pH	6 to 9 pH units
Asbestos	Note 3

Notes

1 Limits in this table are absolute limits, and must not be subject to averaging or statistical interpretation due to the potentially environmentally sensitive applications for non-concrete containing material

2 Hydrocarbon testing not required for road base under bituminous seal or asphalt

3 Inspection, sampling and testing for asbestos is to be carried out in accordance with Section 4.3 of *Guidelines for managing asbestos at construction and demolition waste recycling facilities* (DEC 2012 and as updated from time to time) using the specified weight of evidence approach to assess whether the product specification is met. www.der.wa.gov.au/images/documents/our-services/approvals-and-licences/final-guidelines-asbestos-in-cd-recycling--version-1.pdf

For the purposes of the Roads to Reuse program:

- Recycled road base containing concrete should be assessed against specifications listed in Table 3.
- Recycled drainage rock cannot be used in Public Drinking Water Source Areas (for details of PDWSAs visit www.water.wa.gov.au/urban-water/drinking-water).

Table 3: Concrete-containing recycled road base product specifications (pH above 9[1])

	Road Base Sealed Under Asphalt	
Attributes	Maximum average concentration	Absolute maximum concentration[2]
Metals	(mg/kg dry weight)	(mg/kg dry weight)
Antimony	10	20
Arsenic	20	40
Cadmium	0.5	1.5
Total chromium	60	120
Copper	60	150
Lead	75	150
Mercury	0.5	1
Molybdenum	40	80
Nickel	40	80
Selenium	2	4
Vanadium	25	50
Zinc	200	350
Other		
pH	9 and above pH units	9 and above pH units
Asbestos	Note 3	

Notes

1 Road designers or contractors should implement site-specific controls to minimise run off into sensitive environmental receptors during construction

2 The maximum concentration in any individual sample

3 Inspection, sampling and testing for asbestos is to be carried out in accordance with Section 4.3 of *Guidelines for managing asbestos at construction and demolition waste recycling facilities* (DEC 2012 and as updated from time to time) using the specified weight of evidence approach to assess whether the product specification is met. www.der.wa.gov.au/images/documents/our-services/approvals-and-licences/final-guidelines-asbestos-in-cd-recycling--version-1.pdf

For the purposes of the Roads to Reuse program:

- Road base containing concrete, and with a pH greater than 9, may only be used under bituminous seal or asphalt.
- Recycled products should not be used within 0.5 m of the maximum groundwater level.
- The use of recycled road base is not to occur within the following locations within public drinking water source areas (PDWSAs):
  - Priority 1 (P1) areas
  - Wellhead protection zones
  - Reservoir protection zones.

Further information on PDWSAs can be found at www.water.wa.gov.au/urban-water/drinking-water and dow.maps.arcgis.com/apps/webappviewer/index.html?id=63ddb4ec2a6e463f84028aa3977bab2b

Special circumstances may apply, as per Water quality protection note 25: Land use compatibility tables for public drinking water source areas (https://www.water.wa.gov.au/data/assets/pdf_file/0014/1733/12441.pdf)