

**Metropolitan Region Scheme Amendment No.
999/33A Northbridge Urban Renewal**

Western Australian Planning Commission

**Report and recommendations
of the Environmental Protection Authority**

**Environmental Protection Authority
Perth, Western Australia
Bulletin 969
February 2000**

ISBN. 0 7309 8182 7
ISSN. 1030 - 0120
Assessment No. 1185

Summary and recommendations

The Western Australian Planning Commission proposes to rezone approximately 15.5 hectares of land above and adjacent to the Northbridge Tunnel from the current Metropolitan Region Scheme zoning of Controlled Access Highway to Central City Area, Urban, Other Regional Roads and Primary Regional Roads. This report provides the Environmental Protection Authority's (EPA's) advice to the Minister for the Environment on the environmental factors, conditions and procedures relevant to the proposed scheme amendment.

Section 48D of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposed scheme amendment and on the conditions and procedures to which the proposed scheme amendment should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

Relevant environmental factors

Although a number of environmental factors were considered by the EPA in the assessment, it is the EPA's opinion that the following are the environmental factors relevant to the proposed scheme amendment, which require detailed evaluation in the report:

- (a) Soil contamination; and
- (b) Groundwater contamination.

The EPA has also provided advice in relation to noise and air quality adjacent to the ventilation stacks of the Northbridge Tunnel.

Conclusion

The EPA has concluded that the Metropolitan Region Scheme Amendment No. 999/333A to rezone land above and adjacent to the Northbridge Tunnel from Controlled Access Highway to Central City Area, Urban, Other Regional Roads and Primary Regional Roads can be implemented to meet the EPA's objectives provided the conditions recommended in Section 4 and set out in Appendix 3 are imposed and enforced. The issues of noise and air quality are covered by contractual arrangements on the construction of the Northbridge Tunnel.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposed scheme amendment being assessed comprises the rezoning of land above and adjacent to the Northbridge Tunnel from the current Metropolitan Region Scheme (MRS) zoning of Controlled Access Highway to Central City Area, Urban, Other Regional Roads and Primary Regional Roads.
2. That the Minister considers the report on the relevant environmental factors of soil contamination and groundwater contamination as set out in Section 3.
3. That the Minister notes that further investigations of soil and groundwater quality are to be undertaken to demonstrate the full extent and level of contamination at the site and to determine environmental and health risk.
4. That the Minister notes that, although there is currently insufficient information available to determine if the proposal is acceptable, it is the EPA's opinion that subject to further investigations and satisfactory implementation by the Responsible Authority of the recommended conditions set out in Section 4, the proposal is capable of being managed to meet the EPA's objective.
5. That the Minister imposes the conditions and procedures recommended in Appendix 3 of this report.

Conditions

Having considered the Responsible Authority's commitments and information provided in this report, the EPA has prepared a set of draft conditions which it recommends be imposed if the proposed scheme amendment is approved. These conditions are presented in Appendix 3. Matters addressed in the conditions include the following:

- (a) preparation and implementation of a Soil Contamination Management Plan(s);
- (b) preparation of a Soil Remediation Validation Report(s);
- (c) additional groundwater quality investigations;
- (d) demonstration of no unacceptable impacts on groundwater from residual soil contamination; and
- (e) maintenance of a Contaminated Site Schedule.

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1. Introduction

The Western Australian Planning Commission (WAPC), the Responsible Authority, proposes to rezone land above and adjacent to the Northbridge Tunnel from the current Metropolitan Region Scheme (MRS) zoning of Controlled Access Highway to Central City Area, Urban, Other Regional Roads and Primary Regional Roads (Figure 1).

The Controlled Access Highway zoning was originally put in place at a time when the Graham Farmer Freeway (the then City Northern Bypass) was to be constructed at street level. The decision to place the freeway underground has enabled the development of the land above the tunnel.

The MRS Amendment was referred to the Environmental Protection Authority (EPA) under section 33E of the Metropolitan Region Town Planning Scheme Act in December of 1997. Level of assessment was set as Scheme Assessed, Environmental Review required, as a result of the potential for soil contamination from past land uses and following results of soil sampling undertaken as part of the Northbridge Tunnel development.

In compiling this report, the EPA has considered the relevant environmental factors associated with the proposed scheme amendment, issues raised in public submissions, specialist advice from the Department of Environmental Protection (DEP) and other government agencies, the Responsible Authority's response to submissions and the EPA's own research and expertise.

Further details of the proposed scheme amendment are presented in Section 2 of this report while Section 3 discusses environmental factors relevant to the proposed scheme amendment. The Conditions and Procedures to which the proposed scheme amendment should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides the EPA's Other Advice, Section 6 presents the EPA's Conclusions and Section 7, the EPA's Recommendations.

A list of people and organisations that made submissions is included in Appendix 1. References are listed in Appendix 2, and recommended environmental conditions are provided in Appendix 3.

Appendix 4 contains a summary of the public submissions and the Responsible Authority's responses. The summary of public submissions and the Responsible Authority's responses is included as a matter of information only and does not form part of the EPA's report and recommendations. The EPA has considered issues raised in public submissions when identifying and assessing relevant environmental factors.

The EPA identification of environmental factors and summary of assessment of the relevant factors is included as tables 2 and 3 in Appendix 5.

A plan of the amendment area showing its division into blocks A to I is included as Appendix 6. Appendix 7 shows a table summarising the soil contamination identified to date.

2. The proposed scheme amendment

The proposed scheme amendment area is located between Fitzgerald Street and Lord Street; west of Beaufort Street, between Aberdeen and Newcastle Streets; and east of Beaufort Street, between Parry and Newcastle Streets (Figure 1).

The purpose of the proposed scheme amendment, is to transfer land from the current Controlled Access Highway reservation, which represents the underground construction of the Northbridge Tunnel, to zones in the Metropolitan Region Scheme which will reflect the surface land use following completion of the Northbridge Tunnel, that is Central City Area, Urban, Other Regional Roads and Primary Regional Roads. This will permit the subdivision, sale and development of the land above and adjacent to the Northbridge Tunnel. The MRS will not reflect the underground tunnel as a zone or reserve.

The proposed scheme amendment area is partly within the City of Perth and partly within the Town of Vincent. It is approximately 15.5 hectares in total. The amendment area has largely

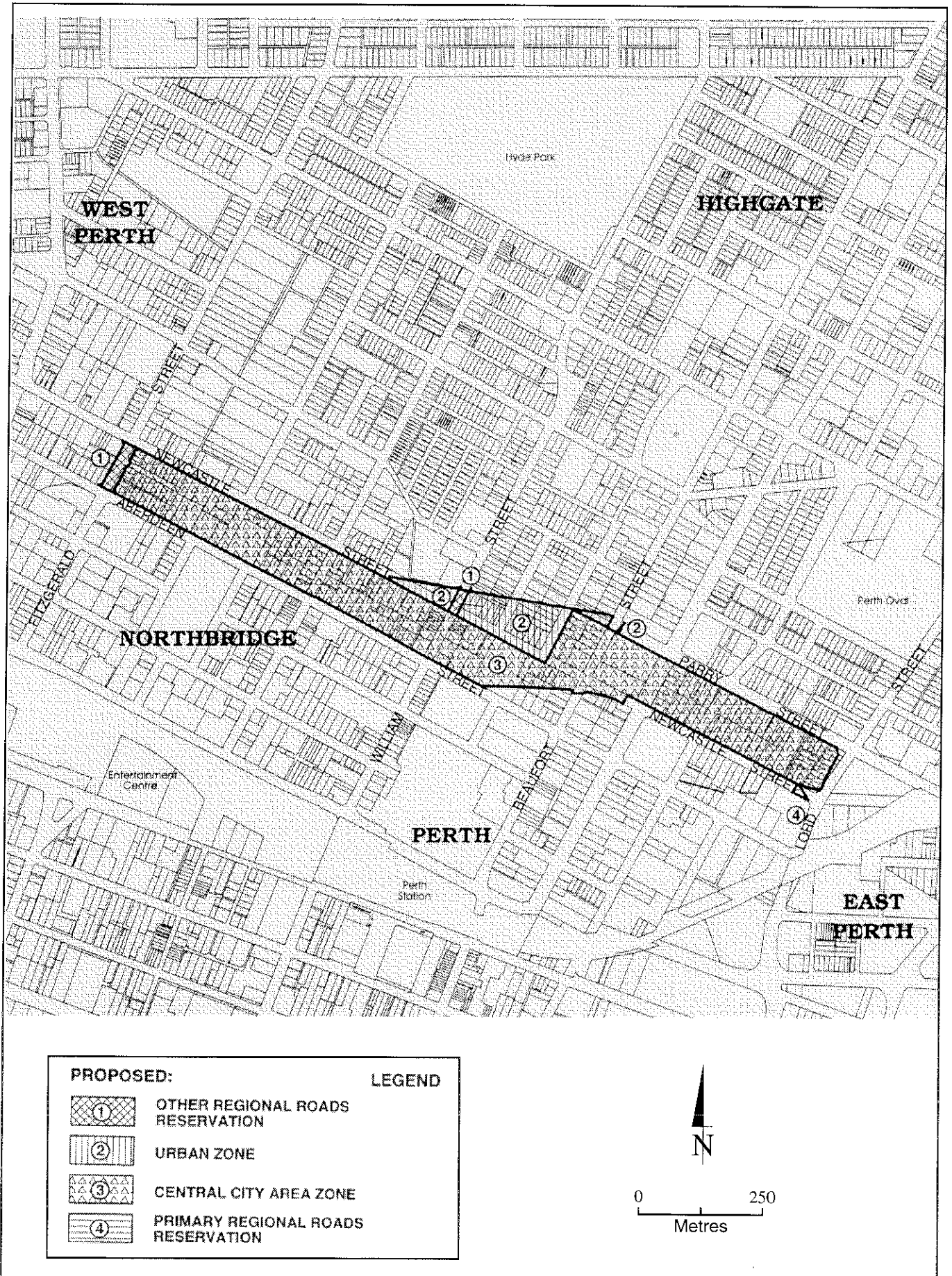


Figure 1. Proposed Scheme Amendment.

been acquired by the WAPC and Main Roads Western Australia since its reservation under the MRS in 1963. Other property owners are the Minister for Training, City of Perth, Town of Vincent and private persons. Current land uses on either side of the tunnel are residential, commercial and vacant.

The land to be rezoned Central City Area is within the City of Perth and conforms with the Central Area boundary as shown in the town planning scheme. The area north of Newcastle Street is within the Town of Vincent and is proposed to be Urban zone. The proposed scheme amendment also reserves the section of Fitzgerald Street and William Street as Other Regional Roads to reflect the current road reservations requirements. The proposed scheme amendment will allow for a variety of residential, commercial and entertainment uses.

The main characteristics of the proposed scheme amendment are summarised in Table 1 below. A detailed description is provided in Section 2 of the Environmental Review document (EGIS Consulting, 1999)

Table 1. Key characteristics of proposed scheme amendment

Element	Description
Total area of land	approximately 15.5 hectares
Existing land uses	residential, commercial and vacant
Local Governments	<ul style="list-style-type: none"> • City of Perth • Town of Vincent
Existing zoning in the Metropolitan Region Scheme	Controlled Access Highway
Proposed Scheme modifications	<p>MRS Amendment 999/33 proposes to</p> <ul style="list-style-type: none"> • rezone the portion within Town of Vincent to Urban • rezone the portion within City of Perth to Central City Area • rezone Fitzgerald and William Streets to Other Regional Roads • rezone Newcastle Street to Primary Regional Roads
Proposed environmental management measures	<ul style="list-style-type: none"> • remediation of contaminated soil to ANZECC B levels or levels determined by a site specific health based risk assessment and/or ecological risk assessment prior to development • maintenance of a Contaminated Site Schedule

Since release of the ER, a modification to the proposed scheme amendment has been made by the Responsible Authority. This is as follows:

- the Primary Regional Roads reservation at the western side of Lord Street has been modified to reflect the current road reservations requirements, as requested by Main Roads Western Australia.

The potential impacts of the proposed scheme amendment and their proposed management are summarised in Table 3 (Appendix 5).

3. Environmental factors

3.1 Relevant environmental factors

Section 48D of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposed scheme amendment and the conditions and procedures to which the proposed scheme amendment should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that the following are the environmental factors relevant to the proposed scheme amendment, which require detailed evaluation in this report:

- (a) Soil contamination; and
- (b) Groundwater contamination.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors (preliminary factors) generated from the Environmental Review document and the submissions received, in conjunction with the proposed scheme amendment characteristics and alternative approvals processes which ensure that the factors will be appropriately managed. On this basis, the EPA considers that the preliminary factors and other issues raised in the submissions do not require further evaluation by the EPA. The identification process is summarised in Table 2 (in Appendix 5).

The land subject to this proposed scheme amendment is within the area affected by the City of Perth Town Planning Scheme 23 and the Town of Vincent Town Planning Scheme 1.

The relevant factors are discussed in Sections 3.2 and 3.3 of this report and summarised in Table 3 (in Appendix 5).

3.2 Soil contamination

Description

Environmental investigations for both the tunnel development and this proposed scheme amendment have identified localised soil contamination, principally in the form of heavy metals, particularly lead. This can be attributed to past and current land uses identified as having the potential to create soil contamination, including car yards, fish cleaner, furniture restoration and store, dry cleaners, galvanising factory, bakery, motor repairs, pest control, and possibly imported fill.

In order to satisfy environmental requirements of the Northbridge Tunnel development, soil contamination investigations included two desktop studies (Rust PPK, 1995 and BCJV, 1996), and a preliminary soil contamination assessment (HGM, 1998). Contaminated soil above the Northbridge Tunnel has since been removed as part of the construction of the tunnel. This was replaced with clean fill and is still subject to validation.

Soil contamination investigations on either side of the Northbridge Tunnel in the amendment area (EGIS, 1999) involved sampling at an average density of two locations per typical sized lot (0.04 to 0.06 hectare). Samples were not taken from private land or where current buildings would not allow access. The contamination investigation divided the amendment area into nine blocks (from 'A' to 'I') for ease of reporting (see Appendix 6). Where access was good and interim results showed soil contamination, a number of lots were sampled at an increased density. Samples were taken at 3 depth intervals; surface to 0.5m; 0.5m to 1.0 m; and 1.0 to 1.5m. In Block B, some samples were taken to 2m where investigations for the tunnel had identified contamination at this depth. Samples were analysed for heavy metals (cadmium, chromium, copper, lead, nickel and zinc), hydrocarbons and/or pesticides based on past or current land uses and field observations.

Criteria used for the assessment of soil contamination levels were the Australian and New Zealand Guidelines for the Assessment of Contaminated Sites (ANZECC/NHMRC 1992) which include Environmental Investigation Threshold (B) levels and Proposed Health Investigation Level Guidelines for a number of common contaminants. Where no Environmental Investigation Threshold is nominated, the Dutch B levels were used (Assinik and Van den Brink, 1986).

The 1998 National Environmental Health Forum Health-based soil investigation levels have been applied in terms of risk to human health. All contaminant levels above ANZECC B have also been subject to a preliminary health risk assessment.

Heavy metals (copper, lead, zinc, cadmium, chromium), dieldrin, TPH, PCBs were identified in excess of environmental investigation levels (ANZECC B). Blocks A and G were determined to be uncontaminated land, where contaminated soil concentrations are below the ANZECC B Guidelines (see Appendix 7). The only contaminant exceeding the health investigation level is lead.

Assessment

The area considered for assessment of this factor is the scheme amendment area.

The EPA's environmental objective for this factor is to ensure the rehabilitation of the site to an acceptable standard that is compatible with the intended land use and consistent with the appropriate criteria.

The EPA considers that contamination investigations undertaken for the Responsible Authority are incomplete and it has not been possible to fully delineate the nature and extent of soil contamination in the amendment area. This is largely due to substantial areas being covered by hard surfaces and buildings so that contamination of the soils on these sites could not be determined.

The EPA notes that the Responsible Authority has proposed management measures to ensure that, prior to development, additional investigations will be performed in areas not sufficiently tested during initial investigations, including those lots where infrastructure is still present. Contaminant levels will then be assessed against ANZECC B or a level determined by a site specific health based risk assessment dependent on the proposed land use for the lot. However, the EPA considers that an ecological risk assessment should be performed where contaminants are to remain on site above ANZECC B levels. A site specific health based risk assessment is only necessary, in addition to the ecological risk assessment, where contaminant levels exceeding the 1998 National Environmental Health Forum Health-based soil investigation levels are to remain on site (NEPC 1999). The EPA considers that these management measures should be addressed in detail in a Soil Contamination Management Plan and a Soil Remediation Validation Report and these have been incorporated into the recommended environmental conditions (Appendix 3).

The EPA also notes that the Responsible Authority proposes that a Contaminated Site Schedule be maintained by the local planning authority(s) to ensure that properties which are not remediated to ANZECC B levels prior to sale will be remediated before development. The Contaminated Site Schedule will identify the investigation status and level of any contamination detected. Those properties subject to a ecological risk assessment, with contamination above ANZECC B levels to remain, will stay on the Contaminated Site Schedule with memorials placed on the titles to ensure that the contamination is reassessed in the event of future rezoning. This approach is expected to be used for commercial and high density residential developments.

The EPA notes that the Responsible Authority considers that the fill above the Northbridge Tunnel is clean (EGIS, 1999). However, validation data to confirm this status has not been provided to the DEP. The EPA considers that those lots above the Tunnel should be treated in the same manner as other lots containing contaminated soil, and require validation.

Summary

Contaminated soils have been found in the amendment area, but having particular regard to the:

- (a) management measures proposed by the Responsible Authority for the remediation of soil to ANZECC B or site specific health based risk assessment criteria and/or EPA's recommended ecological risk assessment, which will be applied as a condition;
- (b) a Soil Contamination Management Plan and Soil Remediation Validation Report to be applied as conditions; and
- (c) the management measure proposed by the Responsible Authority for a Contaminated Site Schedule,

it is the EPA's opinion that the proposed scheme amendment, if implemented, can meet the EPA's environmental objective for this factor, provided that the conditions contained in Appendix 3 are incorporated into the Metropolitan Region Scheme.

3.3 Groundwater contamination

Description

Groundwater contamination was identified during dewatering activities for construction of the Northbridge Tunnel in early 1997 (BCJV, 1997). Monitoring of dewatering identified the presence of acid groundwater with relatively high concentrations of dissolved iron and zinc. The pH levels were greater than those considered acceptable by the Swan River Trust for discharge to the Swan River. Other contaminants appeared to be within acceptable levels.

Dewatering from the Northbridge Tunnel was therefore treated by manual lime dosing and precipitation of zinc and iron in compensating basins prior to discharge to the Swan River, and subjected to a monitoring programme. As a result of dewatering activities, pH increased to around 6 and levels of zinc and iron decreased.

Although contaminated groundwater was identified at this time, further investigations to determine the extent of groundwater contamination were not undertaken.

Residual contamination in soil within the site may be an ongoing source of groundwater contamination. Contaminated groundwater moves towards the Swan River and is abstracted for irrigating parks and gardens (public and private). However, due to the density of development, future private landowners are unlikely to abstract groundwater and commercial bores are required to be licensed by the Water and Rivers Commission (WRC). Nevertheless, the EPA considers it important that groundwater contamination is investigated and that this information is made available to the landowner, Water and Rivers Commission, Swan River Trust, local governments and the Department of Environmental Protection.

Assessment

The area considered for assessment of this factor is the scheme amendment area, downstream area to the Swan River and the Swan River.

The EPA's environmental objective for this factor is to maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the draft WA Guidelines for Fresh and Marine Waters (EPA, 1993).

The EPA notes that remediation of land to levels below ANZECC B should ensure any on-site source of further groundwater contamination is removed. Where soil contaminated above ANZECC B levels will remain on-site, an ecological risk assessment will demonstrate to the DEP that future impact on groundwater from contaminated soil is acceptable.

The EPA considers that existing groundwater contamination data from within or adjacent to the amendment area should be reviewed and complemented with additional sampling to give a regional overview. The data should then be assessed against beneficial use criteria for the area.

If groundwater contamination is found to exceed those beneficial use criteria, specific lots should be included on the Contaminated Sites Schedule proposed by the Responsible Authority.

Summary

Contaminated groundwater has been found in the amendment area, but having particular regard to the:

- (a) the remediation of soil contamination prior to development;
- (b) the licensing of commercial bores by WRC;
- (c) the additional investigations to be performed by the Responsible Authority as specified in the draft environmental conditions;
- (d) the demonstration by fate and transport modelling that where residual soil contamination remains on site the impact on groundwater from contaminated soil is acceptable; and
- (e) the Contaminated Site Schedule to be expanded to include contaminated groundwater as specified in the recommended environmental conditions

it is the EPA's opinion that the proposed scheme amendment, if implemented, is capable of meeting the EPA's environmental objective for this factor, provided that the conditions contained in Appendix 3 are incorporated into the Metropolitan Region Scheme.

4. Conditions

Section 48D of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposed scheme amendment and on the conditions to which the proposed scheme amendment should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions, the EPA's preferred course of action is to have the Responsible Authority provide management measures and/or scheme provisions to ameliorate the impacts on the environment. However, these proposed provisions are not always sufficient to ensure that the EPA's objectives will be met.

Having considered the Responsible Authority's environmental management measures, scheme provisions and the information provided in this report, the EPA has developed a set of conditions which are consistent with but replace those environmental management measures in the proposed scheme amendment documentation, if the proposed scheme amendment is approved for implementation.

These conditions are presented in Appendix 3. Matters addressed in the conditions include the following:

- (a) preparation and implementation of a Soil Contamination Management Plan;
- (b) preparation of a Soil Remediation Validation Report;
- (c) additional groundwater quality investigations;
- (d) demonstration of no unacceptable impacts on groundwater from residual soil contamination; and
- (e) maintenance of a Contaminated Site Schedule.

5. Other Advice

Concerns have been raised regarding noise and air quality associated with the ventilation stacks servicing the Northbridge Tunnel and the impacts on nearby residents. These issues are being dealt with by ongoing advice of the DEP with the contractor for the Northbridge Tunnel and are subject to legally binding requirements through the contract between Government and the contractor.

A monitoring programme is being put in place to measure gases and noise levels to ensure they are below acceptable and agreed limits (Baulderstone Clough Joint Venture 1999). In addition, a Development Control Plan and Design Guidelines will be produced by the Responsible Authority to further detail the redevelopment of the area and account for appropriate separation distances for sensitive land uses.

6. Conclusions

The EPA has concluded that Amendment No. 999/33 to the Metropolitan Region Scheme to rezone 15.5 hectares of land above and adjacent to the Northbridge Tunnel from Controlled Access Highway to Central City Area, Urban, Other Regional Roads and Primary Regional Roads is capable of being managed to meet the EPA's objectives provided the conditions recommended in Section 4 and set out in Appendix 3 are imposed and enforced.

7. Recommendations

Section 48D of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposed scheme amendment and on the conditions and procedures to which the proposed scheme amendment should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposed scheme amendment being assessed comprises the rezoning of land above and adjacent to the Northbridge Tunnel from the current Metropolitan Region Scheme (MRS) zoning of Controlled Access Highway to Central City Area, Urban, Other Regional Roads and Primary Regional Roads.
2. That the Minister considers the report on the relevant environmental factors of soil contamination and groundwater contamination as set out in Section 3.
3. That the Minister notes that further investigations of soil and groundwater quality are to be undertaken to demonstrate the full extent and level of contamination at the site and to determine environmental and health risk.
4. That the Minister notes that, although there is currently insufficient information available to determine if the proposal is acceptable, it is the EPA's opinion that subject to further investigations and satisfactory implementation by the Responsible Authority of the recommended conditions set out in Section 4, the proposal is capable of being managed to meet the EPA's objective.
5. That the Minister imposes the conditions and procedures recommended in Appendix 3 of this report.

Appendix 1

List of submitters

Organisations:

Water and Rivers Commission

Individual:

Urban Focus on behalf of 'The Bog'

Appendix 2

References

- ANZECC/NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*.
- Assinik, J.W. and Van den Brink, W. M. (1986) *Contaminated Soils, First International TNO Conference on Contaminated Soil 11-15 November 1985*. Mattinus Nijhoff Publishers, The Netherlands.
- Boulderstone Clough Joint Venture (BCJV) (1996) *Archaeological Investigations Stage 1*. Boulderstone Clough Joint Venture Report REP/24/G/2022/0, September 1996.
- Boulderstone Clough Joint Venture (1997) letter to DEP re City Northern Bypass - Stage 1 Dewatering Operations Ref 1.15.1/2472 1 April 1997.
- Boulderstone Clough Joint Venture (1999) *Graham Farmer Freeway Operation and Maintenance Environmental Management Plan*. Document No. MN00G0004, 6 December 1999.
- DEP (1997) *Contaminated Sites. Assessment and management of contaminated land and groundwater in Western Australia. A public position paper*.
- DEP (1997) *Environmental Protection (Noise) Regulations*.
- EGIS Consulting (1999) *Environmental Review. Metropolitan Region Scheme Amendment No. 999/33 Northbridge Urban Renewal*. Western Australian Planning Commission.
- Environmental Protection Authority (EPA) (1993) *Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters*. Environmental Protection Authority Bulletin 711, October 1993.
- Halpern Glick Maunsell (HGM) (1998) *Northbridge Urban Renewal Project. Preliminary Soil Contamination Assessment*. Halpern Glick Maunsell Report No. EE974798, January 1998.
- National Environmental Protection Council (NEPC) (1999) *National Environmental Protection Measure for the Assessment of Site Contamination (Schedule B2)*.
- NSW Environmental Protection Authority (1997) *NSW EPA's Contaminated Sites Sampling Design Guidelines, November, 1997*.
- Rust PPK (1995) *Background Study on Potential Contaminated Sites - Burswood Bridge and Road Project*. Main Roads Report No. 132T, April 1995.

Appendix 3

Recommended Environmental Conditions

Recommend Environmental Conditions

STATEMENT THAT A SCHEME MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF DIVISION 3 OF PART IV OF THE ENVIRONMENTAL PROTECTION ACT 1986)

METROPOLITAN REGION SCHEME AMENDMENT NO. 999/33A (NORTHBRIDGE URBAN RENEWAL)

Scheme Purpose:

- (a) to rezone the Northbridge Redevelopment Area from 'Primary Regional Roads Reservation' to 'Central City Area Zone', 'Urban Zone', 'Primary Regional Roads Reservation' and 'Other Regional Roads Reservation', and to amend the Scheme Maps accordingly.

Responsible Authority: Western Australian Planning Commission

Responsible Authority Address: 469 Wellington Street, PERTH WA 6000

Assessment Number: 1185

Report of the Environmental Protection Authority: Bulletin 969

Subject to the following conditions, there is no known environmental reason why the Metropolitan Region Scheme amendment to which the above report of the Environmental Protection Authority relates should not be implemented:

1 Soil Contamination Management Plan(s)

1-1 The Responsible Authority shall require a Soil Contamination Management Plan for any land that has residual soil contamination above ANZECC B levels (Australian and New Zealand Environmental Conservation Council and National Health and Medical Research Council, 1992) or has not been assessed, to be prepared and lodged with a subdivision or development application, whichever occurs first. Determination of an application will be subject to receipt of an acceptable Soil Contamination Management Plan. The Soil Contamination Management Plan shall be to the requirements of the Responsible Authority and to the satisfaction of the Department of Environmental Protection. The Plan shall meet the following objective:

- to ensure the remediation of the site to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria.

The Plan(s) shall:

- i) determine the nature and extent of the soil contamination, indicating where levels exceed ANZECC B;
- ii) identify the remediation approach to be used, either to ANZECC B levels or levels determined by a site specific health based risk assessment and/or ecological risk assessment; and

(Note: Risk assessments shall include fate and transport modelling of groundwater. Where the risk assessment indicates that future groundwater beneficial uses shall be compromised, a monitoring programme is required).

- iii) specify actions to ensure that remediation:
 - occurs prior to the commencement of any development;
 - is to a standard that is suitable for the intended land uses; and
 - is consistent with remediation guidelines recognised by the Department of Environmental Protection.

1-2 The above mentioned Soil Contamination Management Plan shall be implemented.

2 Soil Remediation Validation Report(s)

2-1 Following implementation of the above Soil Contamination Management Plan, and prior to backfilling of clean fill and/or commencement of site works for subdivision or development on any land that has residual soil contamination above ANZECC B, has not been assessed or previously not validated, the Responsible Authority shall require, as a condition of subdivision or development, the preparation of a Soil Remediation Validation Report for the subject land to the requirements of the Responsible Authority and to the satisfaction of the of the Department of Environmental Protection, to meet the following objective:

- to verify the remediation of the site to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria.

The Report shall:

- i) include a diagram identifying where validation samples have been taken;
- ii) describe the justification for the spacing of the validation samples;
- iii) include the analytical results of the validation sampling; and
- iv) specify any additional works, monitoring or management to be undertaken.

(Note: Validation sampling shall be undertaken in accordance with the approach outlined in the New South Wales Environmental Protection Authority Guidelines for Consultants Reporting on Contaminated Sites, November 1997 and include land above the Northbridge Tunnel unless validation of the remediation of the Tunnel has since been approved by the Department of Environmental Protection prior to the date of publication of this statement).

3 Groundwater Contamination Investigations

- 3-1 The Responsible Authority shall require the collection and review of existing groundwater contamination data from within or adjacent to the amendment area and additional sampling to give a regional overview of groundwater quality. The data shall be assessed against beneficial use criteria for the area to the requirements of the Responsible Authority and to the satisfaction of the Department of Environmental Protection.
- 3-2 The Responsible Authority shall provide the groundwater contamination investigations described above to the Water and Rivers Commission, the East Perth Redevelopment Authority, local governments and the Department of Environmental Protection.

4 Contaminated Groundwater Management

- 4-1 Construction dewatering shall be referred to the Water and Rivers Commission and the Department of Environmental Protection, and shall be managed to their requirements.

5 Contaminated Site Schedule

- 5-1 A Contaminated Site Schedule shall be maintained by the local planning authority(s) listing all lots where, prior to sale, residual soil exceeds the ANZECC B level, where the contamination status is unknown, or where groundwater contamination exceeds beneficial use criteria. The Schedule shall identify:
- investigation status; and
 - level of any known contaminants.
- 5-2 A memorial shall be placed on the Titles of all lots where soil contamination in excess of ANZECC B levels is to be retained and/or where groundwater contamination exceeds beneficial use criteria.
- (Note: Those lots above the Northbridge Tunnel, where access to groundwater is constrained, will not require placement on the Contaminated Site Schedule).*

Appendix 4

Summary of Submissions and Responsible Authority's Response to Submissions

Summary of Submissions and Responsible Authority's Response to Submissions

POLLUTION

Soil Contamination

1.1 The Water and Rivers Commission has recommended that soil contamination in the area be assessed in accordance with Australian and New Zealand Environmental Conservation Council (ANZECC) methodology for contaminated sites and that any contaminated soil should either be removed or secured on site in such a manner that there will not be an on-going risk to groundwater quality in the area.

R1.1 The Environmental Review has employed the ANZECC methods in the assessment of soil contamination and proposes that the majority of the identified contamination will be remediated to the ANZECC B Environmental Investigation Threshold prior to the development of land. A site specific health risk assessment will be undertaken on all contaminants where clean-up to ANZECC B Environmental Investigation Threshold is not proposed and any such sites would require records placed on the Titles at subdivision stage and be listed on a Contaminated Site Schedule which could be incorporated into the local town planning schemes. The Environmental Review also proposes that all contaminated material is to be removed from the development area and a Record of Remedial Works outlining remedial works will be provided to the Contaminated Sites Branch of the Department of Environmental Protection. Commitments to this effect have been given, and are detailed in the Environmental Review document which accompanied the Amendment.

Groundwater Contamination

2.1 The Water and Rivers Commission has advised that there is existing groundwater contamination in the area from former industrial land use and that new developers should be aware that groundwater at some sites may be unsuitable for use of the watering of parks and gardens.

R2.1 The Environmental Review acknowledges that the area would have a high to very high vulnerability to groundwater contamination due to the shallow depth to watertable and permeable nature of the surface soils. The future landowners or developers at subdivision stage however, can be informed as a condition on the subdivision that the groundwater at some sites may be unsuitable for use of the watering of parks and gardens.

2.2 The Water and Rivers Commission has recommended that all proposals for dewatering for the construction of infrastructure should be referred to it for comment. This is due to discharge of contaminated groundwater to stormwater drains in the area having the potential to cause impacts in the Swan River, which is the receiving body for most drainage in the area.

R2.2 Prospective developers can be informed of this requirement as a condition imposed by the Commission at subdivision stage.

Noise

3.1 Urban Focus on behalf of 'The Bog' nightclub has stated that the Environmental Protection Authority should not limit its assessment to soil contamination issues identified in the Environmental Review, but should also consider noise in relation to potential residential development in proximity to existing land uses. The EPA should be requested to direct the Western Australian Planning Commission to undertake a noise impact study.

R3.1 In issuing its Instructions on 13 February 1998 the Environmental Protection Authority identified the issue of soil contamination as the environmental factor relevant to the scheme area which was required to be addressed in the Environmental Review. The Environmental Review has addressed the issue of noise only in relation to the need to manage noise levels generated by earthmoving machinery and trucks during remediation of the land. The generation of noise from existing uses is outside the scope of the Environmental Review for the current amendment. Noise generated by existing uses is regulated by the DEP and would need to comply with the Environmental Protection (Noise) Regulations (1997).

Appendix 5

Identification of Relevant Environmental Factors and Summary of Assessment of Relevant Environmental Factors

Table 2. Identification of Relevant Environmental Factors

FACTOR	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
POLLUTION			
Soil contamination	proposed scheme amendment area	<ul style="list-style-type: none"> • The Water and Rivers Commission has recommended that soil contamination in the amendment area be assessed in accordance with Australian and New Zealand Environmental Conservation Council (ANZECC) methodology for contaminated sites and that any contaminated soil should either be removed or secured on site in such a manner that there will not be an on-going risk to groundwater quality in the area. 	Considered to be a relevant factor
Groundwater contamination	proposed scheme amendment area, downstream area to Swan River and Swan River	<ul style="list-style-type: none"> • The Water and Rivers Commission has advised that there is existing groundwater contamination in the area from former industrial land use and that new developers should be aware that groundwater at some sites may be unsuitable for the use of watering of parks and gardens. • The Water and Rivers Commission has recommended that all proposals for dewatering for the construction of infrastructure be referred to them for comment. This is due to the potential for the discharge of contaminated groundwater to stormwater drains in the area to cause impacts on the Swan River, the receiving body for most drainage in the area. • The Contaminated Sites Branch of the DEP has advised that groundwater below the amendment area is contaminated and residual contamination in soil may be an ongoing source of groundwater contamination. Contaminated groundwater moves towards the Swan River and is abstracted for irrigating parks and gardens (public and private). They also advised that insufficient investigations of groundwater contamination have been conducted to determine the contamination status of the groundwater and its impacts. 	Considered to be a relevant factor

FACTOR	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
Noise	proposed scheme amendment area and immediately adjacent land uses	<ul style="list-style-type: none"> Urban Focus on behalf of 'The Bog' nightclub has stated in a submission that the EPA should consider noise in relation to potential residential development in proximity to existing land uses. They have recommended that the EPA should direct the WAPC to undertake a noise impact study from existing licensed premises and that a buffer zone of commercial development be planned around The Bog. This should also be considered during the preparation of the Development Control Plan and Design Guidelines for the project area and any amendments to the relevant Town Planning Schemes. 	<p>Noise generated by existing uses are required to comply with the <i>Environmental Protection (Noise) Regulations (1997)</i>.</p> <p>Managing conflicts between noise generating premises and residential development through separation distances and building codes will be dealt with by the East Perth Redevelopment Scheme. A Development Control Plan and Design Guidelines will be produced and address this issue. An amendment to the EPRA Scheme text will be required to describe the development of the amendment area and is required to be referred to the EPA.</p> <p>Factor does not require further EPA evaluation.</p>

Table 3. Summary of Assessment of Relevant Environmental Factors

RELEVANT FACTOR	RELEVANT AREA	EPA OBJECTIVES	EPA ASSESSMENT	EPA ADVICE
Soil contamination	Proposed scheme amendment area	Ensure the rehabilitation of the site to an acceptable standard that is compatible with the intended land use and consistent with the appropriate criteria	<p>The EPA considers that there is currently insufficient information available to determine if the proposal is acceptable. However, it is the EPA's opinion that subject to further investigations and satisfactory implementation of the Responsible Authority's management measures and additional recommended investigations (to be applied as conditions), the proposal is capable of being managed to meet the EPA's objective.</p> <p>The EPA notes that:</p> <ul style="list-style-type: none"> A soil contamination assessment has been undertaken where possible in the amendment area and identified heavy metals (copper, lead, zinc, cadmium, chromium), dieldrin, TPH, PCBs were identified in excess of environmental investigation levels (ANZECC B). Blocks A and G were determined to be uncontaminated land, where contaminated soil concentrations are below the ANZECC B Guidelines. The Responsible Authority has proposed a number of management measures that may be applied as conditions and presented in a number of management plans. <p>The EPA recommends that the proposed management measures be applied as conditions so that the following Management Plans be prepared prior to submission of an application for subdivision or development approval, whichever comes first:</p> <ul style="list-style-type: none"> Soil Contamination Remediation Plans; and then Soil Remediation Validation Report to ensure that the site is remediated according to the guidelines recognised by the EPA. 	<p>Having particular regard to:</p> <ul style="list-style-type: none"> the presence of contaminated soils within the proposed scheme amendment area; the remediation of soil to ANZECC B or site specific health based risk assessment criteria dependent on the proposed land use; the management measure for a Contaminated Site Schedule, to be applied as a condition; and a Soil Contamination Management Plan and Soil Remediation Validation Report to be applied as conditions; <p>it is the EPA's opinion that the proposed scheme amendment is capable of being managed to meet the EPA's objective.</p>

RELEVANT FACTOR	RELEVANT AREA	EPA OBJECTIVES	EPA ASSESSMENT	EPA ADVICE
Groundwater contamination	Proposed scheme amendment area, those areas adjacent and the Swan River	Maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the draft WA Guidelines for Fresh and Marine Waters (EPA, 1993)	<p>The EPA considers that this factor be added to the assessment of this amendment.</p> <p>The EPA notes:</p> <ul style="list-style-type: none"> • The proposed scheme amendment area is within the Perth Groundwater Area where commercial bores are required to be licensed by WRC. At this point the WRC should advise of groundwater contamination; • Due to the high density nature of the development in the proposed scheme amendment area it is highly unlikely that bores will be sought for domestic use. However, it is considered important that groundwater contamination is investigated and this information is available to the landowner, Water and Rivers Commission (who licence bores) and local governments. • Remediation of land to levels below ANZECC B should ensure that this source of groundwater contamination is removed. <p>The EPA recommends that the following be added as conditions:</p> <ul style="list-style-type: none"> • Existing groundwater contamination data from within or adjacent to the amendment area be reviewed and complemented with samples taken below those blocks with soil contamination above ANZECC B levels, then assessed against beneficial use criteria for the area. If contamination is found to be unacceptable specific lots should be included on the Contaminated Sites Schedule proposed by the Responsible Authority; • Where remediation to levels determined by a health based risk assessment is to be used, and soil contaminated above ANZECC B levels will remain on site, there is a need to demonstrate to the DEP that future impact on groundwater from this soil contamination is mitigated; 	<p>Having particular regard to:</p> <ul style="list-style-type: none"> • the remediation of soil contamination prior to development; • the licensing of commercial bores by WRC; • the additional investigations to be performed by the Responsible Authority as specified in the draft environmental conditions; and • the Contaminated Site Schedule to be expanded to include contaminated groundwater as specified in the draft environmental conditions; <p>it is the EPA's opinion that the proposed scheme amendment is capable of being managed to meet the EPA's objective.</p>

Appendix 6

Plan Showing Division of Amendment Area into Blocks A to I
(from EGIS, 1999)

Appendix 7

Summary of Soil Contamination (from EGIS, 1999)

SUMMARY OF SOIL CONTAMINATION

In excess of Environmental Investigation Levels

Location (Block)	Contaminants	ANZECC B Environmental Investigation Level (mg/kg)	Maximum Contaminant Concentration (mg/kg)
A	None above guidelines		
B	Copper	60	250
	Lead	300	3400
	Zinc	200	950
	Dieldrin	0.2	0.5
	TPH	100	820
C	Copper	60	130
	Lead	300	630
	Zinc	200	880
	PCBs	1	5
D	Copper	60	220
	Zinc	200	2100
E	Copper	60	510
	Lead	300	780
	Zinc	200	670
F	Cadmium	3	3.7
	Chromium	50	100
	Copper	60	150
	Lead	300	3000
	Zinc	200	1500
	Dieldrin	0.2	0.5
G	None above guidelines		
H	Chromium	50	53
	Copper	60	73
	Lead	300	430
	Zinc	200	5500
	TPH	100	12500
I	Copper	60	270
	Lead	300	1000
	Zinc	200	1000
	Dieldrin	0.2	1.3