

Jemena Limited ABN 95 052 167 405

Level 14 99 Walker St North Sydney NSW 2060 PO Box 1220 North Sydney NSW 2060 T +61 2 9867 7000 F +61 2 9867 7010 www.jemena.com.au

Date: 5 December 2018

Dr Teresa Anderson AM Chief Executive Department of Health – Sydney Local Health District Level 11 North, King George V Building, 83 Missenden Road Camperdown, NSW, 2050

Dear Teresa,

RE: Kendall Bay Sediment Remediation Project (SSD 6701) – Department of Health Submission on Environmental Impact Statement.

Introduction

The NSW Department of Planning and Environment (DP&E) provided Jemena Limited (Jemena) with a letter prepared by the NSW Department of Health (DOH) dated 12 November 2018 (Document reference: SF13/60, SD18/31041). The letter contained the DOH's comments on the Environmental Impact Statement for the Kendall Bay Sediment Remediation Project. The letter from DOH is provided as **Attachment A** in this letter.

Jemena has prepared this letter, with input from its consultant/specialists and remediation contractor as required, to respond to the comments presented in the DOH letter. The response to the DOH's submission is provided below.

Response to Submission

Jemena is committed to managing the remediation process implementation of detailed mitigation measures which will be contained within the Remediation Works Environmental Management Plan (RWEMP), the Remedial Work Plan (RWP), and Validation Sampling Analysis and Quality Plan (VSAQP) as well as a number of other documents as described in EIS Chapter 18. These documents are still to be completed.

A response to the first and last dot point in the DOH letter under the heading "Exposure to contaminated sediments" and the two dot points under the heading "Other potential impacts" is provided below. A response to the remaining dot points was prepared by EnRiskS and is provided in a letter in **Attachment B**.

Response to dot point 1 to 7: Exposure to contaminated sediments

PAH is the chemical referred to, and BAP TEQ is taken as the benchmark chemical. Table 11.1. within Chapter 11 of the EIS show benzo[a]pyrene toxic-equivalents (BaP TEQ), representing carcinogenic PAHs.

The adopted treatment in this area [Western edge of SA3] is to leave the mangrove root mass in place and ensure that any materials on the surface of the root mass are cleaned of any coke and coal washed onto the surface of the area as discussed below". "....surface rubbish and weathered coal contamination will be removed to a nominal depth of 0.2-0.3m". This is consistent with the EIS which states in Section 4.3.2 "For the northern area of SA3, surficial coke, coal and rubbish material will be removed / excavated where practicable over the nearshore sand shoal using small earthmoving equipment to a depth of 0.2m. For the southern area of SA3, the existing established mangroves, will be retained and coke and coal removed / excavated using a small excavator with rake bucket / hand tools / vacuum excavation to depth of 0.2m as required to minimise any damage to the mangroves.

Response to dot point 8: Noise

A Construction Noise and Vibration Management Plan (CNVMP) will be developed for the full-scale remediation works. A CNVMP was developed for the field trial and was considered successful in managing noise from the trial works. An important aspect of the CNVMP is ensuring the community is kept informed of the proposed works and provided with details to contact Jemena for further information. As stated in Table 9-8 of the EIS, noise impacts will be managed through the adoption of mitigation measures outlined in Table 9-8 of the EIS and the strict adherence to City of Canada Bay standard construction hours which are 7:00am to 5:00pm Monday to Friday and 8:00am to 1:00pm on Saturday subject to confirmation from Council.

Management and mitigation of potential odour issues associated with the project are a primary focus for the project team. An independent specialist assessment of air quality, including assessment of odour was completed by Todoroski Air Sciences and is included as Appendix 6 of the EIS. Chapter 8 of the EIS summarises the assessment completed by Todoroski and lists Jemena's key commitments to mitigate potential odour issues. A key commitment is to prepare and implement an Air Quality Management Plan (AQMP). The AQMP will include mitigation measures and monitoring with defined trigger levels for further action. The key mitigation measures will include; limit remediation activity to daytime hours, only excavate / expose the minimum area of sediment necessary at any one time, cover each skip bin of excavated material immediately once filled, minimise the drop height of the excavator, regular cleaning of remediation equipment, develop and implement a plan for complaints management and conduct ongoing stakeholder engagement.

Response to dot point 9: Safety

Sheet piles will be removed from areas NA2 and NA3. The sheet piles in SA1 will be cut at LAT 0.0 and remain in-situ below this depth. The risk of injury from the top of the sheet piles will be managed by cutting off the top of the sheet piles at the LAT mark. Further investigations are being undertaken regarding the prevention of scouring to these areas. These methods are being refined, and will be clarified within the RWEMP and RWP documents.

Closing

Yours sincerely

Phil Hutson Project Manager, Kendall Bay Sediment Remediation Project

Attachment A – DOH Submission (reference SF13/60, SD18/31041)



SF13/60 SD18/31041

Deana Burn Department of Planning Industry Assessments Email: <u>deana.burn@planning.nsw.gov.au</u>

Dear Ms Burn

Thank you for the opportunity to comment on the recent exhibition of the Environmental Impact Statement (EIS) for the Kendall Bay Sediment Remediation Project SSD 14_6701. Sydney Local Health District Public Health Unit (SLHD PHU) has reviewed the EIS, focussing on issues that may impact human health. We would like to make the following submission for your consideration.

SLHD PHU supports the adequate remediation of the contamination at Kendall Bay, as existing contamination may impact the health of frequent recreational users of the bay and its southern and western shorelines.

The comments provided below are contingent on confirmation by the NSW Environmental Protection Agency (EPA) that the methods and modelling employed to assess the environmental impacts of the current contamination and the proposed remediation are appropriate.

Exposure to contaminated sediments:

- The chemicals of most concern to human health were found to be polycyclic aromatic hydrocarbons (PAHs), particularly carcinogenic PAHs, levels of which are expressed as benzo[a]pyrene toxic equivalents (BaP TEQs). However, throughout the EIS it is often not clear that BaP TEQ is the benchmark chemical. Many tables within *Appendix 3: Human Health Risk Assessment (HHRA)* pertain to BaP TEQs but they are not explicitly identified as such. For example, the *Proposed Remediation Criteria* tables (e.g. *Table ES-1*) provide site-specific remediation criteria in mg/kg without stating which chemical the table refers to. We recommend all tables are clearly labelled.
- In *Chapter 14 Human Health* of the EIS it is unclear why the remediation criteria for PAHs in the western corner of Kendall Bay are significantly more stringent than those of the beach area and central mangrove area. Although this is covered in the *HHRA* we recommend a brief explanation be given in relevant sections within the EIS accessed by most readers.
- In the initial assessments in the EIS, total recoverable hydrocarbons C15-C28 (F3 TRH) are included as chemicals of concern with levels above relevant guideline values. However, later in the EIS, F3 THR is no longer considered as a chemical of

PO Box M30 Missenden Road, NSW, 2050 Email slhd-esu@health.nsw.gov.au www.slhd.nsw.gov.au Sydney Local Health District ABN 17 520 269 052

Level 11 North, King George V Building 83 Missenden Rd CAMPERDOWN, NSW, 2050 Tel 612 9515 9600 Fax 612 9515 9610



potential concern, following exposure assumptions being adjusted to a more realistic scenario.

- However, F3 THR levels were found to be 14,000 mg/kg in the mangrove area at depth (>300mm) (*HHRA Table 39, p55*), which is above the adjusted guideline value of 7,500 mg/kg. Further, the Assessment of Site Contamination National Environmental Protection Measure (ASC NEPM) Health Based Investigation Levels and Screening Levels are frequently interchanged with ACS NEMP Management Limits. It is unclear why one guideline is used over the other and vice versa and can make it difficult to interpret the validity of excluding F3 THR. We recommend that the logic for rejecting F3 THR is more clearly outlined.
- The exposure frequency assumptions underlying the remediation criteria calculations are based on professional judgment. This may be the best option available, but it is difficult to identify that this is the basis of the assumption in the HHRA. We recommend that this be stated more explicitly and that a short explanation is given for the exposure frequency assumptions used.
- The sensitivity analysis should include a clear interpretation of what the results mean when varying the exposure frequency and bioavailability (*HHRA tables 56 and 57, p91*).
- The remediation method for the western edge of mangroves in SA3 should be clarified further as to what exactly is planned for the mangrove root mass. The EIS and HHRA do not entirely correspond with each other and the information presented should be consistent.

Other potential impacts:

- There will be some intermittent exceedances of odours and noise for some nearby sensitive receivers. We recommend all reasonable and feasible mitigation measures be put in place to reduce the impacts by as much as possible.
- It is unclear whether the sheet piling in areas SA1, NA2, and NA3, after the remediation works is complete and cut to below the level of low tide, could pose a potential risk of injury to people wading along the shoreline. We recommend this be clarified.

I trust this information is of assistance. Should you require any further information please contact Dr Zeina Najjar, Acting Director Public Health Unit, Sydney Local Health District on telephone (02) 9515 9420.

Yours sincerely

Dr Teresa Anderson AM Chief Executive Date 12.11,18

PO Box M30 Missenden Road, NSW, 2050 Email slhd-esu@health.nsw.gov.au www.slhd.nsw.gov.au Sydney Local Health District ABN 17 520 269 052

Level 11 North, King George V Building 83 Missenden Rd CAMPERDOWN, NSW, 2050 Tel 612 9515 9600 Fax 612 9515 9610 Attachment B – EnRiskS Specialist advice.



Environmental Risk Sciences Pty Ltd PO Box 2537 Carlingford Court NSW 2118

Phone: +61 2 9614 0297 Fax: +61 2 8215 0657 Email: <u>inquiry@enrisks.com.au</u>

www.enrisks.com.au

Attention: Phil Hutson/Oliver King

Level 14, 99 Walker Street

North Sydney NSW 2060

4 December 2018

Jemena

Re: Provision of Advice – NSW Health Comments – Kendall Bay HHRA

Environmental Risk Sciences Pty Ltd (enRiskS) has been engaged by Jemena to prepare advice in regard to comments provided by NSW Health on a Human Health Risk Assessment for sediment contamination in Kendall Bay. The HHRA was prepared by enRiskS on behalf of Synnot Wilkinson. The HHRA was provided to NSW authorities as part of a development application (DA) and environment impact statement (EIS) for remediation of the sediments in Kendall Bay.

This advice directly addresses the queries raised by NSW Health. The HHRA will not be updated to include any additional information.

Comments from NSW Health

NSW Health provided the following comments after reviewing the EIS:

- The chemicals of most concern to human health were found to be polycyclic aromatic hydrocarbons (PAHs), particularly carcinogenic PAHs, levels of which are expressed as benzo[a]pyrene equivalents (BaP TEQs). However, throughout the EIS it is often not clear that BaP TEQ is the benchmark chemical. Many tables within the HHRA (Appendix 3 of the EIS) pertain to BaP TEQs but they are not explicitly identified as such. For example, the proposed remediation criteria listed in Table ES-1 provided sitespecific remediation criteria in mg/kg without stating which chemical the table refers to. We recommend all tables are clearly labelled.
- In chapter 14 of the EIS it is unclear why the remediation criteria for PAHs in the western corner of Kendall Bay are significantly more stringent than those of the beach area and central mangrove area. Although this is covered in the HHRA we recommend a brief explanation be given in the relevant sections within the EIS accessed by most readers
- In the initial assessments in the EIS, total recoverable hydrocarbons (C15-C28) (i.e. F3 TRH) are included as chemicals of concern with levels above relevant guideline values. However, later in the EIS, F3 TRH is no longer considered as a chemical of potential, following exposure assumptions being adjusted to a more realistic scenario
- 4. However, F3 TRH levels were found to be 14000 mg/kg in the mangrove area at depth (i.e. >300 mm) which is above the adjusted guideline value of 7500 mg/kg. Further the ASC NEPM investigation levels and screening levels are frequently interchanged with the management limits. It is unclear why one guideline is used over the other and vice versa and can make it difficult to interpret the validity of excluding F3 TRH. We recommend that the logic for excluding F3 TRH is more clearly outlined.
- 5. The exposure frequency assumptions underlying the remediation criteria calculations are based on professional judgement. This may be the best option available, but it is difficult to identify that this is



the basis of the assumption in the HHRA. We recommend that this be stated more explicitly and that a short explanation is given for the exposure frequency assumptions used.

- 6. The sensitivity analysis should include a clear interpretation of what the results mean when varying the exposure frequency and bioavailability
- 7. The remediation method for the western edge of the mangroves in SA3 should be clarified further as to what exactly is planned for the mangrove root mass. The EIS and HHRA do not entirely correspond with each other and the information presented should be consistent
- 8. There will be some intermittent exceedances of odour and noise for some nearby sensitive receivers. We recommend all reasonable and feasible mitigation measures be put in place to reduce the impacts as much as possible.
- 9. It is unclear whether sheet piling in areas SA1, NA2 and NA3, after the remediation works are complete and the sheet piles are cut to below low tide level, could pose a potential risk of injury to people wading along the shoreline. We recommend this be clarified.

Response to comments

enRiskS provides the following responses:

Comment 1

Remediation criteria were only developed for carcinogenic PAHs and all tables referring to remediation criteria should have made clear that the listed numbers should be applied to the carcinogenic PAH measurements for a sample or in an area. Table ES-2 and Table 78 make reference to carcinogenic PAHs in the table title when outlining how the values were to be applied to each of the relevant areas in the Bay.

Comment 2

Chapter 14 of the EIS was prepared by other authors without reference to enRiskS. An explanation that could be included in the response to submissions is:

As discussed in Section 7.2.2 of the HHRA, different parts of the southern part of Kendall Bay have different types of contamination arising from the historic contamination and the way the hydrodynamics of the embayment distributes materials. The beach area contains sands with some weathered coal pieces. The mangrove area has some sands with weathered coal pieces but also has some more muddy material with PAHs attached to the particles. The western end of the Bay is affected by coal tars and these are present at the surface. The weathered coal pieces and the more muddy material have been tested to determine how bioavailable the PAHs in these materials are – for the weathered coal pieces the PAHs were not very bioavailable, for the more muddy materials the PAHs were more bioavailable. The coal tars in the western end of the Bay, however, were not tested for bioavailability because, as noted in the ASC NEPM, it is considered that the PAHs in these oily materials have the potential to be 100% available and a more conservative approach should be adopted in their management. The criteria for the western end of the Bay are more stringent than for other areas due to the nature of the contamination in this corner of the Bay – coal tars – which are more bioavailable than assumed for the other parts of the Bay. The calculations for the western end of the Bay assumed PAHs were 100% bioavailable, for the mangrove area 20% bioavailable was assumed and for the beach area 10% bioavailable was assumed.



Comment 3 and 4

The ASC NEPM provides a number of guidelines that may be relevant for consideration when evaluating potential risks from F3 TRH. Some discussion of the screening of the data for F3 TRH was provided in Section 6.1.3 of the HHRA. The following issues are noted to provide further clarification:

- The carcinogenic PAHs are analysed via a specific analytical method for the suite of relevant polycyclic aromatic hydrocarbons. In addition, these chemicals are also measured within the F3 TRH analysis. So, focusing on the carcinogenic PAHs in this assessment means that the most toxic fraction of this group of hydrocarbons was specifically addressed using appropriate values for the characteristics relevant to this most important sub group
- CRC CARE Technical Report 10 evaluated the risks due to the F3 TRH fraction using exposure scenarios relevant for soil (rather than sediment) to allow determination of a health based screening level. These calculations were considered within the ASC NEPM. The exposure scenario for recreational contact assumes a child is directly exposed to material 365 days per year for 6 years (0-6 yrs) with 50 mg soil ingested per day and hands, lower arms, feet and lower legs being exposed each day. For this scenario, the direct contact screening guideline for F3 TRH was 5320 mg/kg (HSL-C direct contact). This scenario was designed for situations where a child could be taken to a park close to home on a daily basis because a family lives in a unit or has limited backyard area.
- In addition to a health based screening level, the ASC NEPM also contains a management limit for F3 TRH. This limit is based on ensuring soils at a site are not odorous or discoloured. The limit is 2500 or 3500 mg/kg depending on the soil properties (mud or clay compared to sand).
- As part of this HHRA, some additional adjustments to these criteria were considered. It was noted that dermal exposure was the major contributor to the risk calculations that generated the direct contact guideline (HSL-C direct contact). Some adjustments to the direct contact guideline based on reducing the number of days on which dermal exposure was likely to occur were considered. If dermal contact could only occur every second day of the year then the guideline becomes 9000 mg/kg. According to the ASC NEPM, it is relevant to consider such adjustments if the nature of exposures at a site are likely to be different to the generic scenarios used. Given the nature of how people may come into contact with these sediments the area under the mangroves is not particularly easy to access for a small child and it is not an area likely to be visited regularly it was considered that adjustments could be made.
- The sediments most contaminated with F3 TRH are under water at all times so, even if a person was to come into contact with these sediments, the sediments would be immediately washed off which means the chemicals could not be adsorbed through the skin (dermal) or incidentally ingested (i.e. not a complete exposure pathway).
- For areas that are not under water at all times, the concentrations of F3 TRH reported for every sample collected in the beach area were below the original direct contact F3 TRH screening level and the F3 TRH management limit from the ASC NEPM and CRC CARE Technical Report 10 for both surface and depth.
- For areas that are not under water at all times, the concentrations of F3 reported for the mangrove area were divided into the surface samples (i.e. above the mangrove root mass) and the samples at depth (i.e. below the mangrove root mass).



- The samples at the surface within the mangrove area range between <100 and 6600 mg/kg so most of the samples were below the original HSL-C for F3 TRH and even the maximum concentration was below the adjusted guideline based on being exposed dermally to these materials every second day instead of every day.
- The samples at depth within the mangrove area range between <100 and 14000 mg/kg. While some of these locations reported somewhat elevated values these sediments are not actually accessible to visitors to the Bay. To take these samples required specialised equipment to cut through the root mass and significant effort from the adult males using the specialised equipment. It is not considered that there is a complete exposure pathway for children to these sediments. Even so, if they could be exposed, it is unlikely that they would be exposed on a regular basis as per the exposure scenario used in the ASC NEPM. The adjusted guideline for coming into contact dermally with these sediments every 4 days across the 6 years of childhood rather than every day would be 14000 mg/kg.
- Using criteria for the carcinogenic PAHs to inform the remediation will also be protective for those locations where F3 TRH was elevated because it occurs at the same locations. This is in because F3 TRH includes the carcinogenic PAHs so where they are high the F3 TRH will also be high. In addition, the additional hydrocarbons that form F3 TRH are from the same source as the carcinogenic PAHs the gasworks. So areas of higher contamination for both groups of chemicals will be the same.

Comment 5

Table 45 in the HHRA provided details on the exposure frequency assumptions used in the risk calculations. It was noted in the table that these assumptions were based on professional judgement as noted by NSW Health.

The reasoning behind the assumptions is as follows:

- Most sensitive lifestage for these risk calculations was a small child i.e. a child between 0 and 6 years old. Such children are taken by their carers to play in areas like the beach section of Kendall Bay and are supervised at all times, especially when nearer the water. In addition, observations over the last 10 years during site visits, monitoring events etc have indicated that the areas outside the beach are not well accessed. The large stormwater outlet within the mangroves makes it difficult to access that area at times after storms etc. The area in the western corner of the bay is quite difficult to access given the nature of the sediments (not very solid to walk on and messy). So, considerations for the exposure frequencies used in the calculations focused on a small child and what was considered most relevant for them. Previous risk assessments did calculations for older children on the basis that teenagers could visit the area more regularly including the more contaminated sections, however, more recent observations during the site investigations indicated that this did not happen given the redevelopment of the area and the accessibility of these areas.
- Visits to beach area for a small child it was assumed that a small child would be taken to visit the beach area on 40 days per year. This was based on 2 days per week for the 5 warmer months of the year and 1 day per fortnight in the 7 cooler months of the year (i.e. 54 days in total). The impact of tide was then considered by assuming 70% of these visits would occur when the tide was low enough for the child to play in affected sediments without sediments that adhere to the skin being washed off as the child leaves the area (i.e. 54 days * 0.7 = 38 days rounded to 40). This was based on a consideration of the tidal



charts and how often a tide that was low enough to expose the relevant areas occurred during the day.

- Visits to mangroves it was assumed that a small child could enter these areas every second time they visited the beach. This was based on the age of the child, the presence of a wall between the beach and this area and the presence of a large stormwater outlet amongst the mangroves. These would be likely to discourage carers from allowing a child to move into that area.
- Visit to western corner it was considered unlikely that a small child would ever visit this area given the distance and effort required to reach this area and the presence of tars at the surface which would discourage a carer from taking a small child into this area. It was, however, assumed for the risk calculations that a child would visit this area 20 times per year.

Comment 6

Sensitivity calculations were undertaken for this assessment to show the impact on the remediation criteria calculations if some of the more critical parameter values were varied. Table 46 in the HHRA shows the parameters for which values were varied. Section 9.3 discusses the results of these calculations. Parameter values for skin surface area, bioavailability and exposure frequency were varied in the sensitivity analysis.

Further to the summary at the end of Section 9.3, the findings of the sensitivity analysis were:

- Changing the parameter values for bioavailability or skin surface area did not make much difference to the proposed remediation criteria (Tables 54/55 and Tables 58/59).
- Only a small change in the proposed remediation criteria was determined if older children were considered instead of small children (Tables 60/61). The change that was noted would have made the criteria less conservative.
- Changing the exposure frequency had more of an impact on the proposed remediation criteria but it was considered that the values used in the primary risk calculations were the most appropriate values. This was based on the considerations discussed above and after discussion with agency and community representatives.

Comment 7

It was my understanding that the mangroves in SA3 were not to be removed during the remediation. The sand overlying the mangrove roots across most of this area was to be cleaned up by removing coal/coke pieces (and other rubbish if relevant) and additional clean sand was to be added to the area where appropriate. The section of SA3 immediately adjacent to the western part of the Bay (i.e. adjacent to SA1) had some areas where coal tars were close to the surface. For this area, the more stringent remediation criterion was to be applied to the surface materials (i.e. 1 mg/kg), but it was not expected that mangroves would be removed but rather that surface materials were to be removed to reduce the level of contamination in the materials to which people could be exposed. The part of SA3 that is in front of the mangroves is closer to the beach area and was to be dealt with as part of the redesign of the stormwater outlet.

Comment 8

Out of scope for enRiskS



Comment 9

Out of scope for enRiskS

Limitations

Environmental Risk Sciences Pty Ltd has prepared this letter for the use of Jemena 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 letter.

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

The methodology adopted and sources of information used are outlined in this letter. Environmental Risk Sciences Pty Ltd 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 contained in the reports provided for use in this assessment was false.

This letter was prepared in November 2018 and is based on the information provided and reviewed at that time. Environmental Risk Sciences Pty Ltd disclaims responsibility for any changes that may have occurred after this time.

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

If you require any additional information or if you wish to discuss any aspect of this advice, please do not hesitate to contact Therese or Jackie on (02) 9614 0297.

Yours sincerely,

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Therese Manning (Fellow ACTRA) Principal Environmental Risk Sciences Pty Ltd

Jackie Wright (Fellow ACTRA) Principal/Director Environmental Risk Sciences Pty Ltd