Mordialloc Bypass Project

Report of Helen A Jones

1 Introduction

My organisation, WSP, prepared the impact assessment report titled Contaminated Land Impact Assessment (Report) which is included as Appendix L to the Environment Effects Statement (EES) for the Mordialloc Bypass Project (Project).

The role that I had in preparing the Report was as technical reviewer for contaminated land aspects particularly in relation to landfill related contamination including landfill gas and PFAS. Mr Jonathan Hilliard, a specialist contaminated land practitioner and landfill gas modeller, provided input into the assessment of landfill related gas risk. Mr Shane Dennis provided oversight of the entire contaminated land investigation and assessment and acted as part of the contaminated land assessment team.

I adopt the Report, in combination with this document, as my written expert evidence for the purposes of the Mordialloc Bypass Project Inquiry and Advisory Committee's consideration and reporting in respect of the Project.

2 Qualifications and experience

Appendix A contains a statement setting out my qualifications and experience, and the other matters in accordance with Planning Panels Victoria's 'Guide to Expert Evidence'.

A copy of my curriculum vitae is provided in Appendix B.

3 Further work since preparation of the Report

Since the Report was finalised, I have undertaken a review of the Alternative Lower Dandenong Road / Mordialloc Bypass Freeway Interchange Arrangement presented by Mr Peter Kelly of WSP on 3 January 2019. In my opinion, the alternative arrangement does not require any change to the EPRs relevant to contaminated land or Acid Sulfate Soil (ASS) management.

4 Written Submissions

4.1 Submissions Received

I have read the public submissions in respect of the EES and draft Planning Scheme Amendment for the Project and identified those that are relevant to the Report and my area of expertise. These include the following submissions that note concerns or comments relating to land contamination, landfill and ASS:

28, 60, 62, 69, 81, 83, 84, 87, 92, 97, 98, 102

4.2 Summary of Issues Raised

The submissions have raised the following general issues relevant to my area of expertise:

A. Historic landfill with reference to leachate and landfill gas management;
B. Spoil management with reference to ASS;
C. General environmental management with reference to contamination including potential spills response, general contaminated groundwater and surface water management; and
D. Proposed changes to the EPR CL 1 to CL7 suggested by Kingston City Council.
4.3 Response to Issues Raised

1. Set out below are my comments and responses to the issues raised in the written submissions relevant to my area of expertise.

A - Historic landfill – Leachate and Gas

2. Concern has been raised in relation to the construction of structures such as piles through old landfill waste and the potential impact on ground water and other potential receptors such as nearby wetlands, Port Philip Bay and Mordialloc Creek.

3. The planned bypass does cross the western portion of a former landfill located at Lot 1 Grange Road. For context, this Lot is also surrounded by a number of other landfills and former landfills to the east, south and west.

4. Due to the age of many of these landfills including Lot 1 Grange Road, their construction comprised direct filling of former sand quarries with waste material. No formal engineering barriers were known to have been constructed to separate waste material from the surrounding environment. It is therefore reasonable to assume that waste within the landfills surrounding the Project alignment are directly connected with the underlying groundwater.

5. Where a landfill is not hydrologically separated from groundwater by a physical barrier, leachate is considered to be water within the waste mass that is derived from either groundwater, self-generation through biological breakdown of waste or through infiltrated surface water.

6. Landfill leachate typically contains compounds and characteristics that directly relate to the deposited waste along with indicators that relate to degradation such as varying physiochemical indicators (pH, BOD, COD) and landfill indicators such as dissolved methane, ammoniacal nitrogen and metals.

7. The physical investigations and contamination testing undertaken either on or in the immediate vicinity of Lot 1 Grange Road indicated contamination of groundwater by a range of metal and organic compounds. The presence of indicator contamination either beneath or in the immediate vicinity of unlined landfills is a usual occurrence as the waste and leachate is not contained / separated from the environment.

8. It is noted that the parameters identified in the investigation represent the existing situation and should be considered the “baseline” condition prior to construction activities commencing.

9. The Project does require the construction of pile foundations within or directly adjacent to the waste mass at Lot 1 Grange Road. The pile types proposed for this construction have been selected to mitigate the excavation of waste (driven or displacement piles) and to minimise the creation of vertical pathways for contaminant migration.

10. I consider, based on the proposed design, that there is a low risk that the road construction will increase the existing contamination levels observed in groundwater in the vicinity of the landfills. This is due to the design effectively “bridging” the waste which results in the distribution of the pavement weight to the piles. The road pavement structure then sits on the ground as a light weight structure. Waste compression that could result in expulsion of leachate contamination into the environment is therefore minimised.

11. Where waste materials are disturbed, it is however reasonable to assume that some localised remobilisation of existing contamination could occur in the short term. Some minor chemical variances are likely within the immediate vicinity of a disturbance through the construction period. During and post construction, groundwater monitoring would be required to ensure that leachate and other contamination does not increase the existing impact to groundwater. The EES has identified the need for a Water Management and Monitoring Plan (WMMP) that requires groundwater and surface water within the vicinity of the construction activities to be monitored throughout the construction
phase and for a period of five years following construction. The WMMP will specify trigger levels (water quality in surface water bodies and groundwater) and will detail contingency plans that would be implemented in the case of trigger levels exceedance.

12. I consider this approach consistent with industry best practice and that it is appropriate for the proposed works.

13. Based on my experience, the overall long term situation in relation to leachate impact on groundwater is unlikely to vary significantly from the existing position. I consider this because:
   - Waste materials are already present beneath the alignment including waste related contamination;
   - Leachate currently containing waste derived contamination is directly connected to the underlying groundwater whereby the leachate is the source and transfer mechanism to groundwater; and
   - Underlying groundwater is impacted by several other historic old landfills.

14. The mitigation measures proposed by the Project result in a low risk to groundwater within the vicinity of the closed landfills.

15. In relation to landfill gas, production rates, migration potential and risk resulting from the Project have been assessed as part of the EES.

16. Risk mitigation for landfill gas has been included into the design along the Lot 1 Grange Road area where the road pavement will sit directly upon waste. This proposed mitigation includes:
   - impermeable barriers to drainage lines and services to prevent ingress and potential migration of gas;
   - a passive landfill gas venting system beneath the roadway to reduce the risk of gas build up beneath the roadway corridor; and
   - a landfill gas monitoring provision within the EPRs.

17. Landfill gas will be subject to specific management plans that will be reviewed and approved by the Environmental Protection Authority Victoria (EPA) prior to implementation. It is my opinion that the approach to landfill gas management is appropriate and consistent with industry best practice.

B - Spoil management - Acid Sulfate Soils

18. ASS occur naturally over extensive areas of low-lying coastal land, predominantly below 5 metres Australian Height Datum (AHD). These soils may be found close to the natural ground surface but may also be buried at depth in the soil profile. This includes the soil or sediments below 5 metres AHD where the natural ground level of the land is above 5 metres AHD.

19. To facilitate the development of the EES, a desktop review and initial screening exercise was undertaken for ASS due to the prevalence of acid generating soils within the Melbourne area. Documented geological mapping indicated that the southern portion of the alignment comprised Holocene aged geology which was confirmed via analysis to contain potential ASS (PASS).

20. This situation is not uncommon in low lying coastal environments and considerable regulatory guidance has been developed to mitigate the risks posed by ASS to the environment.

22. The IWMP establishes the statutory framework for the identification, assessment and management of WASS and defines ASS as “any soil, sediment unconsolidated geological material or disturbed consolidated rock mass containing metal sulphides which exceeds criteria for acid sulfate soils specified in Publication 655 entitled Acid Sulfate Soil and Rock.” The assessment criteria for soil and rock is specified in EPA Publication 655.1.

23. In accordance with the IWMP off-site disposal or reuse of WASS may only occur at premises that are:

- Licensed to dispose of that type of waste under the Environmental Protection Act 1970;

or

- “Where an Environmental Management Plan prepared in accordance with the Policy, has been approved by the Authority.”

24. In summary, construction works to be undertaken within the Project alignment will likely encounter soil and potentially rock formations which comprise metal sulphides (principally pyrite). If the spoil resulting from construction works within these formations is classified as WASS and allowed to oxidise there is the potential for the generation of acidic discharges.

25. The EES proposes the development of an Acid Sulfate Soil Management Plan prior to construction activity commencing within the Project alignment. This plan would be prepared in accordance with Victorian guidance to the satisfaction of the EPA. The sub-plans specified will:

- consider locations and the extent of PASS that could be disturbed or otherwise affected by the Project;

- consider the assessment of potential impacts on human health, odour impacts and environmental impacts;

- consider the identification and implementation of risk mitigation measures to prevent oxidation of ASS wherever possible;

- consider the implementation of construction material durability specifications where required; and

- identify suitable sites for management, reuse or disposal of WASS.

26. It is my opinion that the above measures are consistent with industry best practice for the management of ASS risks associated with major construction projects. I consider that ASS can be appropriately managed within the regulatory framework governing this Project and that the likely resultant risk of acid generating materials impacting the environment is low.

C - General environmental management with reference to contamination

27. The management of contamination is a key consideration that forms part of the Construction Environmental Management Plan (CEMP). Specific provisions relating to fuel and hazardous chemical storage (eg. greases, lubricants, paints etc) are included within such documents and are subject to Australian standards and Health and Safety and Environmental guidance relating to containment and storage of materials, spill response, waste management, overland flow management (surface water) etc. The document will contain procedures for the clean-up of accidental releases and monitoring and reporting provisions in line with the Project Environmental Management System.

28. In addition to the above, a procedure for general surface water management within the construction area will be included. This procedure will consider contaminants such as total dissolved solids and physio chemical characteristics such as pH. Where construction is within a potential / identified
contaminated area, mitigation in the form of diversion bunds and/or collection drains would be required so that water is not able to migrate off site to an adjacent area. Such provisions are generally employed as part of water management practices on all major construction projects. Monitoring of identified sensitive receptors will also be included in the procedure.

29. The EES states that a CEMP will be prepared prior to construction activities commencing.

30. In relation to potential deep excavation and the management of potentially contaminated water resulting from dewatering activities, it is noted that deep excavations are currently not proposed within the design. This has resulted in limited contaminated groundwater management information being included within the proposed CEMP.

31. I do however consider that if detailed design proposes excavations that intersect groundwater either within an area known to be contaminated or in the vicinity of a potentially contaminative activity then a management provision should be included within the construction documentation. I would recommend that this information be included within the WMMP and that the WMMP be referenced as part of the CEMP and Soil Management Plan (SMP).

32. In potentially contaminated environments it is recommended that site specific procedures for waste water management (surface and ground water) be included per excavation that specifically consider the potential contaminants of concern that are likely to be encountered. An example suggested by Kingston City Council for consideration is the presence of hydrocarbon (dissolved and Non Aqueous Phase) resulting from nearby fuel stations. These locations should be identified at detailed design stage and provision for the management of such contaminants should be specified along with potential volumes and proposed treatment options within the appropriate construction documentation. Using hydrocarbons as an example, the inclusion of an oil/water separator or appropriately designed water treatment solution could be included if fuel contaminated water is expected. Such provisions should be included in the construction stage WMMP.

33. I consider that a CEMP as described in the EES is consistent with industry best practice for environmental management of major projects. I would however suggest that the CEMP links and refers to other proposed documents such as the WMMP for completeness.

**Proposed changes to the EPRs suggested by Kingston City Council**

34. The submission issued by Kingston City Council (Council) raises a number of contaminated land concerns and considerations that are considered below. They have also recommended potential measures to address their concerns.

35. Council has made comments in relation to the road alignment intersection of the former Din San landfill. For clarification, the planned bypass predominantly crosses the western portion of the former landfill located at Lot 1 Grange Road and not the Din San landfill (with the exception of an access) as illustrated on Figure 1 below. Council’s comments specifically refer and relate to landfill management and monitoring of the Din San landfill and are therefore not considered relevant for the proposed alignment.
36. Council proposes an amendment to AQ2 to mitigate odour impact that could result from excavation into putrescible waste.

37. Intrusive investigation within the alignment identified no visual putrescible waste material. There is a potential however for putrescible waste to be encountered. The nature of the waste accepted at Lot 1 Grange Road (predominately solid and liquid industrial) however suggests that encountering large volume of putrescible material is unlikely. In addition, the pile types proposed as part of the design limit the need to excavate waste material. Any unforeseen putrescible waste encountered would be managed as part of the soils management plan in order that environmental emissions (including odour) are limited. Amendment of the EPRs associated with contaminated material management are therefore not warranted.
38. Council proposes an amendment to EPR W3 to secure proposed protection measures relating to ASS and potential spill management.

39. The proposed management plans (SMP, WMMP and CEMP) are proposed to be developed in line with Victorian legislative guidance. This approach is considered to be in line with industry best practice for major project development. As noted in 27 above, the aspects identified by Council shall be specifically considered with review and signoff sought through the EPA, amongst others. An amendment to EPR W3 is therefore not considered necessary as Council’s concerns are deemed to have been covered.

40. Council has identified the potential for its assets (not specified) to be impacted by a change of landfill gas flow.

41. A landfill gas assessment has been included within the EES that specifically considers pathway linkages and new pathway generation. It is noted that no existing infrastructure has been identified as being a concern in this regard. The design includes in ground gas barriers for proposed infrastructure along with a passive vent system to alleviate gas build up beneath the corridor.

42. Council’s proposed amendments are not considered appropriate given the proposed design and mitigation.

43. With regard to Council’s concerns relating to EPR CL1 it is noted that a procedure for unforeseen contamination that includes temporary containment removal and verification is typically included as part of the CEMP documentation. The intent of the SMP is to specifically consider management of identified contaminated land (including ASS) for the purposes of facilitating construction.

44. I confirm that the SMP will consider contaminated soils and other in-ground solid wastes including Asbestos. As noted in my comments above I recommend that contaminated ground and surface water be considered as part of the WMMP. Other construction related wastes materials such as fuels, packaging materials, paints and industrial chemicals should be considered as part of the CEMP documentation.

45. An amendment to CLR 3–5 is proposed by Council in relation to works at the landfill areas. They make specific comments relating to landfill gas, engineering design and oversight. The following comments are relevant:

- Landfill gas management and monitoring are relevant and have in my opinion been considered as part of the EES submission. Gas production rates, migration potential and risk resulting from the Project have been assessed and risk mitigation through design has been included as required. This includes the addition of impermeable barriers to drainage lines and services, along with a passive landfill gas venting system beneath the affected roadway that reduces the risk of gas build up beneath the roadway corridor and provides a preferential pathway for gas ventilation.

- Lot 1 Grange Road landfill area does not currently possess an engineered capping system, which means that the landfill is currently passively venting gas to the atmosphere.

- If a landfill gas capture and destruction system were to be employed then this would need to comprise an integrated system for the Project corridor and landfill. Council’s suggestion that gas management be undertaken for the Project alone is not practical or feasible.

- The Project reference design would not preclude capping, capture or destruction of landfill gas in the future.

- The Project has a defined pathway for design, review, consultation and construction which is considered to be robust and appropriate for the proposed activity. The
engagement of an Environmental Auditor is not considered necessary given this process which included regulator review and approval stages. The management of construction activities will be in accordance EPR CL4 including the development of a landfill gas monitoring plan.

46. Council proposes an amendment to EPR CL1 in relation to soil management, water management and vapour. Comments relating to this proposal are as follows:

- As noted in 32 above, I consider that the WMMP should be expanded to consider contaminated groundwater management within the alignment.

- With regard to vapour, specific consideration has been given to landfill gas (including trace gases) risk as part of the EES. Health and safety risks associated with the management of soil or groundwater contamination impacted by volatile contaminants will be included within the relevant SMP / WMMP / CEMP, all of which will be subject to EPA review and approval. It is noted that PFAS compounds are non-volatile and will therefore not be considered in this regard.

- ASS, landfill gas and PFAS will be subject to specific management plans that will be reviewed and approved by the EPA prior to implementation.

47. It is my opinion that the proposed approach to contaminated material management (soil, water and vapour) that may be encountered during construction stage is appropriate and consistent with industry best practice and the relevant regulatory guidance.

48. Council requires relevant statutory approvals or agreement to proposed PFAS management methodology to be confirmed by EPA. The provision for this action is currently part of the EES.

49. A requirement for asbestos management to be included in EPR CL1 has been requested by Council. As noted in 44 above Asbestos will be covered as part of the SMP and will include appropriate waste handling and health and safety provisions.

50. Council proposes an amendment to EPR CL1 and CL2 in relation to the SMP to ensure that statutory approvals are gained and agreement to proposed methodology. The provision for this action is currently part of the EES.

51. Specific reference has been made to the volume of potentially contaminated soils and provisions for storage prior to disposal. The intent of the SMP will be to provide information and methodology that considers the management, temporary storage and disposal of soils including the specific environmental management requirements if in addition to those specified in the CEMP.

52. This approach is consistent with industry best practice and will be presented to the EPA for review and approval. Council will also be provided with the documentation for comment and agreement.

Declaration

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Inquiry and Advisory Committee.

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Signed

Date: 15/02/2019
Appendix A  Matters Raised by PPV's Guide to Expert Evidence

(a)  The name and address of the expert
Helen Ann Jones
34 Murray Street Birkdale QLD 4159

(b)  The expert's qualifications and experience
BSc Hons Engineering Geology 1996
Member of Australian Land and Groundwater Association (ACLCA) - vice president ACLCA Qld Branch.
Member Environment Institute of Australia and New Zealand,
Chartered Waste Manager (UK) MCIWM,
Chair of Consult Australia Environment Committee for QLD
Suitably Qualified Person under Charger 7 Part 8 of the Environmental Protection Act QLD 1994.

(c)  A statement identifying the expert's area of expertise to make the report
Helen Jones is a specialist contaminated land and waste management practitioner with over 20 years international engineering consultancy experience. As Technical Executive CLM, Helen specialises in developing pragmatic, implementable solutions for clients. As a recognised leader in contaminated land and waste management, Helen has developed extensive public and private sector experience across multiple markets, industries and throughout the entire project lifecycle.

In recent years, Helen has acted as lead contamination and waste management advisor for several major projects such as Gateway Upgrade North and the Bruce Highway Upgrade QLD. She has also had significant involvement in several Defence infrastructure upgrade projects such as Land 17, 17CS and Land 121 and the Battlefield Airlifter project at RAAF Amberley. Helen also had extensive involvement as lead designer for the Cox Peninsular remediation project in NT. She has acted as a WMMA judge for the landfill design innovation category for the 2017 Landfill and Transfer Station Conference in Coffs Harbour and has recently presented at the WAA conference relating to resource recovery.

Helen's areas of expertise are: Contamination (resulting from industrial and waste sites), Landfill & Waste Engineering, Risk Assessment & Management, Environmental Legislation and Compliance with emphasis on landfill, their management and related environmental impact.

(d)  A statement identifying any other significant contributors to the report and where necessary outlining their expertise
Shane Dennis has over 16 years’ industry experience and is the Team Manager for the Contaminated Land Management Team in Melbourne. Shane acted as the contamination and acid sulfate soils discipline lead, overseeing the required investigations and providing technical review where required.

Jonathon is a contaminated site consultant with over 16 years' experience directly related to the environmental management of landfills. His key focus in landfill management over the years has been the assessment of risk and subsequent management of landfill gases. He has vast experience in the implementation of landfill gas risk assessments, designed and installed a number of landfill gas protection measures and presented at both national and international conferences specifically on the subject of the characterisation of landfill gas risk. Jon has also worked on a number of landfill gas-to-energy projects both at the feasibility and implementation phase of works.

Outside of the landfill gas sphere Jon has worked extensively in the greater waste management field. He has prepared and implemented a number of landfill closure and ongoing monitoring programs for sites in QLD, NT and NSW. He has directly implemented large ongoing
monitoring programs for open and closed facilities across NSW and VIC and prepared concept designs for leachate controls including waste cell leachate drainage systems and leachate wetlands. Jon has also undertaken feasibility assessments and siting projects for new potential facilities.

(e) **All instructions that define the scope of the report (original and supplementary and whether in writing or oral)**

Letter instruction from Clayton Utz dated 10 December 2018.

(f) **The identity of the person who carried out any tests or experiments upon which the expert has relied on and the qualifications of that person**

A number of staff from the Melbourne contaminated land management team were utilised to undertake specialist testing and monitoring as part of the contaminated land and acid sulfate soil investigations. These staff included:

- Olfa Nazario
- Joanne Hanvey
- Sam Aldous
- Jack McBain
- Liam High
- Alex Healy
- A number of specialist subcontractors were also required including laboratories and drilling contractors. On-site contractors were supervised by contaminated land management staff noted above. ALS laboratories was utilised as the primary laboratory undertaking chemical analysis of collected soil and groundwater samples.

(g) **A statement setting out any questions falling outside the expert's expertise**

No questions presented within the submissions were outside of my experience.

(h) **A statement setting out any key assumptions made in preparing the report**

I have assumed that the EES and reference design has not been updated and that no material change to the alignment has occurred since the issue of the EES.

(i) **A statement indicating whether the report is incomplete or inaccurate in any respect**

At the time of preparation the report is considered to be complete.
Appendix B

CV
HELEN JONES,
Technical Executive, Contaminated Land Management

PROFILE
Helen Jones is a specialist contaminated land and waste management practitioner with over 20 years international engineering consultancy experience. As Technical Executive CLM, Helen specialises in developing pragmatic, implementable solutions for clients. As a recognised leader in contaminated land and waste management, Helen has developed extensive public and private sector experience across multiple markets, industries and throughout the entire project lifecycle.

She is a member of ALGA, EIANZ, ACLCA and the Waste Management Association of Australia. Helen is a chartered waste manager (UK), vice president ACLCA Qld Branch, chair of Consult Australia environment committee for QLD and a Suitably Qualified Person under Charger 7 Part 8 of the Environmental Protection Act QLD 1994.

In recent years, Helen has acted as lead contamination and waste management advisor for several major projects such as Gateway Upgrade North and the Bruce Highway Upgrade QLD. She has also had significant involvement in several Defence infrastructure upgrade projects such as Land 17, 17CS, Land 400 and Land 121 and the Battlefield Airlifter project at RAAF Amberley. Helen also had extensive involvement as lead designer for the Cox Peninsular remediation project in NT. She has acted as a WMMA judge for the landfill design innovation category for the 2017 Landfill and Transfer Station Conference in Coffs Harbour and has recently presented at the WAA conference relating to resource recovery.

Helen areas of expertise are: Contamination (resulting from industrial and waste sites), Containment Engineering, Risk Assessment & Management, Environmental Legislation and Compliance with emphasis on landfill, their management and related environmental impact.

PROFESSIONAL EXPERIENCE

Melbourne Metro – Technical Advisor Design Joint Venture
Helen has worked with the design team to develop effective management and disposal options for PFAS impacted soils identified on the Melbourne metro project. This has included gaining regulator sign off for disposal and consideration of beneficial reuse options for low level soil volumes. She has also provided advice relating to landfill gas risk and construction design requirements associated with new development within landfill buffer zones.

Cap design – Technical Lead Richmond Hospital Asbestos containment cells, Townsville Hospital and Health Service 2018 ongoing
Helen has provided cap design advice for this containment project. She has used her waste and contaminated land management experience to develop a technically robust containment solution and series of exposure management documentation to facilitate the project. Helen has undertaken tender evaluation and will audit construction. The project included the engineering containment design for asbestos contaminated soils identified at the hospital. Helen was responsible for development of the specification and design advice associated with this construction project.

The project involved desktop (Stage 1) and intrusive (Stage 2) contamination assessments of the proposed Project footprint. The findings of the investigation were used to inform Project design and provide preliminary options and costings for remediation. Helen is the technical reviewer and lead for all contaminated land aspects associated with this project. Packages of work include assessment of PFAS and hydrocarbons contamination, contaminant mapping, risk assessment, Fuel Farm remediation specification development, volume estimates for remediation and development of a Remediation Action Plan. The project has commencing construction stage and now includes the engineering design support (Asbestos and PFAS) cell design and construction.

Revision date: 17/10/2017
HELEN JONES,  
Technical Executive, Contaminated Land Management

Helen has lead and reviewed the preparation of the PFAS containment area design and associated documentation (layout liner and capping) including the construction specifications, detailed design report, Cost Estimating, Construction Human Health Risk Assessment, Contaminated Soil Management Plan and the Operational Management Procedures for the facility.

- **Cox Peninsular Remediation, Department of Treasury, Technical Reviewer and Containment Design Lead – Containment Design.**

  Working as part of the remediation team, Helen has acted as technical design reviewer and lead designer for the proposed Cox Peninsula ‘Section 34 – Containment Cell’, in NT. As lead designer Helen was responsible for the detail design of the 10 m deep containment cell with an air space volume for the placement of general waste (non-putrescible) of about 27,000 m³. The design was undertaken in accordance with Northern Territory Environment Protection Authority (NTEPA), 2013, Guidelines. Where no design guidance was provided by NTEPA, the Environment Protection Authority - Best Practice Environmental Management - Siting, design, operation and rehabilitation of landfills, Publication 788.3* dated August 2015 (BPEM) was used.

  Helen oversaw the preparation of the design documentation including a technical specification, detailed design report, detail design drawings, risk register and bill of quantities for the containment cell. The containment cell design included a base and capping liner system and associated drainage infrastructure. The baseliner system comprised of geosynthetic clay liner, HDPE geomembrane, drainage aggregate and pipes, non-woven geotextile and a leachate collection layer which was collected at a single slump at the base of the cell where the leachate could be collected via a riser pipe. The capping system comprised of a non-woven geotextile, drainage aggregate, geosynthetic clay liner, HDPE geomembrane and a subsoil and topsoil.

- **Gateway Upgrade North DJV Contaminated Land Lead/SQP.**

  Helen acted as lead contaminated land advisor to the DJV for the GUN D&C project. She worked in collaboration with the designers to actively assess and manage the contaminated land risks associated with the design and follow on construction works associated with the highway development. This was particularly relevant when considering design and construction risks associated with the adjacent closed landfill site.

- **Proposed Landfill Sunshine Vic, Barro Group, Project Manager / Technical Lead.**

  Technical lead responsible for development of proposed landfill cell and cap design, works approval application supporting documentation and preparation of site selection information and technical evidence for expert panel at subsequent VCAT hearing.

- **Transpacific Clayton landfills incl Fraser Road No 2 Landfill Vic, Transpacific, Project Manager.**

  Assisted statutory contaminated land auditor with assessment relating to historic groundwater issues associated with the regional landfill sites. Stormwater concept design and development of management plans for landfill operations.

- **Cranbourne Landfill Gas Management, City of Casey, Technical Advisor.**

  Helen was part of the audit team responsible for the conceptualisation, Auditors LFG risk assessment and remediation methodology supervision and review for the City of Casey Cranbourne Landfill gas remediation project in Victoria.

- **Landfill Engineering and Legislation, UK Environment Agency, Expert Witness.**

  Acted as Landfill Expert for a criminal prosecution being progressed by the Environment Agency’s Crime Team. Helen undertook technical assessment of a significant illegal waste deposit in southern England, the assessment included a legislative review of the
Landfill Directive and the engineering requirements that should have been employed were the operation acting within the Environmental Permitting Regulations. In addition, a chemical assessment and waste characterization exercise based was designed and led by Helen with support from EA officers. This was undertaken in order that the correct designation of waste could be made.

Part of the evidence required by the EA was cost avoidance as a result of the illegal operation. In order to calculate these costs, Helen designed an appropriately sized Landfill Directive compliant cell and associated infrastructure and produced costs for all elements including production of supporting documentation, construction and permitting. These costs now form evidence in support of fund recovery through the Proceeds of Crime Act.

- **Technical Advisor - Secondment, UK Environment Agency, Project Manager & Technical Advisor.**

Helen was seconded into the Environment Agency for 3 days per week as technical advisor to provide support to the PPC and environment protection teams in Thames West Area. Her role involved technical review and assessment of submitted information, providing perspective to officers with regard to reasonable regulation and guidance on legislation interpretation. Areas of work include:

  - Construction Quality Assurance proposals and validation for waste facilities including landfill development documentation, transfer and MRF sites, PPC now EP technical documentation including hydrogeological, stability and landfill gas risk assessments to support existing permit conditions or to facilitate changes in conditions, Technical assessment of sites currently regulated under WML in order that focused and proactive regulation can be undertaken, working towards license surrender reviews and timelines. Surrender application reviews and consultation, area consultee reviews of EP applications for landfill and other waste management activities such as RGN3 reviews for siting hazardous waste landfill cells associated with proposed energy from waste plants, Hazardous waste transfer sites – BAT (Best Available Techniques) reviews (acceptance procedures etc.) in line with SGN 5.06 Upper tier industrial PPC COMAH assessment – production of site safety reports, EMS system compliance to ISO 14001.

- **Lead Designer and Approvals Lead for Low Level Radioactive Waste Storage, Magnox**

Helen was responsible for the preparation of the Concept Design Development and associated documentation for the four proposed below ground storage facilities. She also oversaw the preparation of the Pollution Prevention and Control approvals permitting and regulatory compliance application (Radioactive Substances Act) for the development of “on site” Low Level Waste disposal areas during demolition of four nuclear installations at the Hinkley Point A, Sizewell A, Bradwell A and Dungeness A facilities.

A Best Practicable Means assessment was undertaken by Helen to support the design and approvals applications.

- **Landfill siting study SE QLD, Confidential client, Technical Lead / Project Director.**

Assisted a major waste management company with their plans to site and establish new waste management infrastructure, including new landfills. Helen has supported this client through identifying suitable locations to advising on the approval pathway and the effective engagement and management of associated stakeholders.

- **Stoneyhill Closed Landfill, Telford and Wrekin - Gap Assessment and Scoping Report, Telford and Wrekin Council, Project Manager.**
Helen worked with Telford and Wrekin to assist with assessing whether Stoneyhill Closed Landfill Site met the requirements of being classified as 'Contaminated Land' under Part IIA of the Environmental Protection Act 1990. The project objectives were to develop the conceptual understanding of the site from a Part IIA context and undertake investigation works from funding secured through the DEFRA Contaminated Land Capital Projects Programme. As project manager, Helen supervised junior staff and provided technical guidance for this project.

**Sherborne Closed Landfill, Dorset County Council, Project Director (Technical Lead).**

The project included the assessment of potential contaminated land issues associated with the former Sherborne landfill site. The project included a quantitative assessment of contamination issues, CCTV survey of structurally distressed culvert, geotechnical assessment including stability assessment of the site slopes, resistivity surveys, recommendations for leachate extraction and treatment, detailed risk assessment and potential liability assessment for the site owners discussions with regulators on client behalf. The project team includes multidiscipline individuals including specialists in tunnel construction.

**Conygar Closed Landfill, Dorset County Council, Project Director.**

The site ceased operation in 1977, whereupon a leachate management system was incorporated into the site infrastructure. Little information was available on landfill restoration works other than the leachate treatment plant. This plant was designed as an activated sludge treatment system which is typically used for treating relatively 'young' leachate. The client was provided with a feasibility review and detailed design proposals for the renovation and refurbishment of the existing treatment plant to a new low cost plant suitable for treating aged leachate (typically ammonia and iron rich). Project included contract management, for construction phase and provision of assistance for later claim issues.

**Wern Ddu Closed Landfill Site, Carmarthenshire, Camarthen County Council, Project Manager.**

Project manager for this commission for Carmarthenshire County Council to review, investigate and assess the condition of a closed landfill site, with a history of leachate pollution of adjacent watercourses. Following preparation of an ‘Options Report’ for site management and remediation, a programme of further monitoring, investigation and assessment was developed for the Council to implement a strategy for long term phased remediation of the site.

**Tir John Landfill Swansea, Swansea City Waste Disposal Company, Project Manager.**

Responsible for project delivery, quality, coordination and financial aspects - for this extensive commission which included the management, coordination, checking, delivery and financial control of the following technical inputs: Desk study review of information provided by the client and included a number of reports carried out for the site. Detailed design of a new ‘piggybacked’ landfill cell in accordance with the specifications of the Environment Agency and the newly implemented Landfill Directive. Detailed intrusive investigation works of proposed cell development area, included waste classification and detailed settlement predications. Qualitative Risk Assessment to determine to level of environmental risk associated with the proposed cell construction. Site investigation works to facilitate the assessment of the local hydrogeology. Production and interpretation of a detailed site wide hydrogeological conceptual model and probabilistic quantitative risk assessment using LANDSIM (Version 2.5) Update of the existing site Working Plan. Ongoing liaison with the Environment Agency and other consultee's such as Countryside Council for Wales. Preparation of sites PPC application.
— Westfield Integrated Waste Management Complex Scotland, Westfield Group, Project Manager.

Project manager responsible for the delivery, financial control and planning for the following three work aspects which included: PPC / Environmental Permitting, Contamination Study, Infrastructure Design and Development, Landfill Design and Engineering. The project involved the development of the former Westfield open cast coal site into an integrated waste management facility.

PROFESSIONAL HISTORY

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<tr>
<th>Company</th>
<th>Years</th>
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<tr>
<td>WSP</td>
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<tr>
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<td>LBH Wembley Geotechnical and Environmental</td>
<td>1996 – 2000</td>
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