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Statement of Environmental Effects
Modification Proposal
Gas Collection System & Landfill Gas Flare
Eastern Creek Recycling Ecology Park

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This Statement of Environmental Effects has been prepared by Jackson Environment and Planning Pty Ltd, Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060.

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We declare that:

The statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and the information contained in the statement is neither false nor misleading.

Report version	Authors	Date	Reviewer	Approved for issue	Date
Draft	R. Loemker	26/11/21	Dr M. Jackson	Dr M. Jackson	26/11/21
Final	R. Loemker	29/11/21	Dr M. Jackson	Dr M. Jackson	30/11/21

EXECUTIVE SUMMARY

The Eastern Creek Recycling Ecology Park was originally approved (MP 06_0139) under Part 3A (now repealed) of the Environmental Planning and Assessment Act 1979 (EP&A Act) and the project was transitioned to a State Significant Development (SSD) on 2 October 2020. Consequently, MP06_139 is now considered to be SSD. Under the variation of Environment Protection Licence 13426, issued on 10 September 2021, Condition U1.2(b) requires Dial-A-Dump (EC) Pty Ltd (**DADEC**) to submit all required documentation to support the commissioning of a proposed permanent flaring system by 30 November 2021 to the Department of Planning, Industry and Environment (DPIE) to implement. This Statement of Environmental Effects and supporting documentations seeks to fulfil compliance with this requirement.

The DPIE has advised that the assessment of the Modification Proposal will be assessed under section 4.55(1a) of the *Environmental Planning and Assessment Act* 1979. This approval pathway was confirmed in writing by DPIE on 9 September 2021.

This Statement of Environmental Effects (SEE) has been prepared to accompany the application for the Modification Proposal and addresses all of the Secretary's Environmental Assessment Requirements (SEARs) as recommended by DPIE on 9 September 2021. This SEE evaluates the likely impacts and provides an overview of operational and environmental mitigation measures in terms of air quality, noise, hazard and risks, stormwater runoff quantity and quality, biodiversity, Aboriginal cultural heritage and visual amenity. Specialist consultants were engaged to carry out assessments on air quality and noise impacts in accordance with the SEARs requirements.

DADEC (a fully owned subsidiary of Bingo Industries Ltd) are seeking a development modification (the Modification Proposal) to install a gas collection system and permanent landfill gas flares to support the operations of the Eastern Creek Recycling Ecology Park.

The Modification Proposal seeks to build on the success of the temporary landfill gas collection and treatment system and provide a more permanent solution to reduce the environmental impact of gases that would be otherwise discharged to the atmosphere from the landfill. The Modification Proposal seeks to capture up to 85 percent of generated landfill gas and combust this gas with 98 percent destruction efficiency within two permanent, enclosed flares at a rate of 3,000 standard cubic metres per hour. The proposed flares to be installed are Run Energy model OEF-300. The flares will be approximately 8m high and located approximately 50m northeast of the Materials Processing Centre 1.

The flares have been designed to achieve the requirements as set out by NSW Environment Protection Authority, through the *'Environmental Guidelines for Solid Waste Landfills' (2016), the Protection of the Environment Operations Act 1997*, and the *Protection of the Environment (Clean Air) Regulation 2021*. The flares would also be constructed, installed and operated in accordance with relevant Australian Standards.

The Modification Proposal will involve the following works:

- Installation of two 1,500 m^3/hr high temperature, fully enclosed landfill gas (LFG) ground flares and supporting infrastructure;
- Construction of a 19m x 34m engineered hardstand area for supporting the landfill gas flare flares;
- Construction of a stainless-steel condensate knockout pot;
- Erection of a 1.8m high palisade security fence around the flare units and surrounding area (total 45m x 45m);
- Construction of a 450 mm main header line to connect the permanent flare; and
- Decommissioning of the temporary flares that have been installed to address odours issues.

The following works are also required, though these works are within the scope of the original approval under MP06_0139. As a result, the impacts of these works have not been considered further in this SEE:

- Replacement of a portion of the existing 160mm header line with a new 355mm header line;
- Extension of the LFG network through the installation of additional 355mm header line;
- Construction of in-line barometric condensate traps to remove any condensate build up; and
- Remedial works in order to compact the clay liner back to its previous state (approved under MP06_0139).

The permanent landfill gas flares will replace the existing temporary flares that were installed on the landfill in response to management of landfill gas. The permanent flare as described in this Modification Proposal will provide an ongoing and highly efficient solution to reducing the potential for the release of methane (a greenhouse gas) and hydrogen sulphide gas (an odorous 'rotten egg' smelling gas) from the surface of the landfill, which can be produced in non-putrescible landfills under high moisture content conditions. The permanent flares will also provide the Facility with future potential co-generation capabilities to reduce reliance on electricity during peak demand periods.

The Modification Proposal seeks to capture up to 85% of generated landfill gas and combust this gas with 98% destruction efficiency within two permanent, enclosed flares at a rate of 3,000 standard cubic metres per hour. In a recent Senate estimates hearing, a representative of NSW EPA stated that a dramatic reduction in odour complaints was experienced following the installation of the temporary flare system, with monitoring of hydrogen sulphide around the premises indicating that concentrations were observed to "pretty much go to zero". The installation of the permanent flare system will generate further air quality improvements as supported by air quality assessment undertaken for the Modification Proposal.

The findings of the air quality impact assessment indicate that the concentrations of all pollutants assessed are below the NSW EPA air quality criteria, at all residential and industrial locations surrounding the Site, even with the addition of existing air pollutant concentrations. The air quality impact assessment confirms that with the Modification Proposal the operation of the Facility would not result in exceedances of the hydrogen sulphide criterion in any of the residential or industrial areas surrounding the Site. In relation to greenhouse gas emissions, the capture and treatment of methane results in emissions of CO_2e being 67% lower when compared to the uncontrolled and untreated release into the atmosphere. The Modification Proposal provides a preferential environmental outcome, when compared with a pre-landfill gas capture and treatment scenario.

The predicted operational noise levels for the Site with the flare operating shows compliance with the operational approval noise limits established under MP06_0139 for the day (7.00am-6.00pm), evening (6.00pm-10.00pm), night (10.00pm-5.00am) and morning shoulder (5.00am-7.00am) assessment periods. The flare noise contribution is marginal to the extent that it does not contribute to the overall site noise level.

The predicted construction noise levels associated with the construction of the flares and the existing Eastern Creek REP are compliant with the operational approval noise limits.

All other environmental aspects that may be affected by the Modification Proposal have been assessed including hazard and risks, stormwater runoff quantity and quality, biodiversity, Aboriginal cultural heritage and visual amenity. It has been determined that the Modification Proposal will not impact or result in significant changes to hazard and risks, stormwater runoff quantity or quality, biodiversity, Aboriginal cultural heritage or visual amenity.

Overall, the Modification Proposal provides a preferential environmental outcome, when compared with a pre-LFG capture and treatment scenario. The proposed permanent flare at Eastern Creek REP will result in approximately 265 000 tonnes of carbon dioxide equivalent avoided each year, which equates to an annual greenhouse gas emission reduction of 67 percent, when compared to a pre-flaring situation.

Flaring LFG to manage landfill gas destroys most of the non-methane organic compounds (including air pollutants and VOCs) that are present at low concentrations in uncontrolled LFG, which reduces possible health risks from these compounds.

A summary of other key benefits of the proposed landfill gas capture project are:

- The capture and treatment of a large proportion of LFG;
- Allows the treatment by combustion of the captured LFG, which:
    - oxidises methane (CH_4) to carbon dioxide (CO_2), thereby reducing the greenhouse gas impact of those emissions; and
    - oxidises odorous gases (such as H2S) to less-odorous compounds.
- Responding to community and regulatory requirements for the treatment of LFG emissions.

As part of the assessment process, NSW Environment Protection Authority and Blacktown City Council were consulted on key environmental issues which may need to be considered in the Statement of Environmental Effects. The NSW EPA advised that no further specific environmental issues needed to be address and were satisfied to receive and review the final proposal. Bingo Industries Ltd have undertaken two briefings on November 17 and 29 respectively to Blacktown City Council prior to lodgement of this application. Blacktown City Council have also confirmed that they may accept Bingo's offer for a more detailed briefing on the permanent flare project post-lodgement of the Development Modification application with DPIE.

This SEE has given consideration to all relevant legislation and policies and has conducted an assessment of potential environmental impacts. It concludes that the Modification Proposal and its associated potential environmental impacts are unlikely to have a negative impact on the environment and all minor risks and impacts can be effectively managed through the implementation of mitigation measures during proposed works and during the long-term operation of the project.

Additionally, the reduction in GHG emissions as a result of the operation of Modification Proposal means the overall environmental impact is considered positive. Other positive benefits include a reduced risk of potential sub-surface migration of landfill gas and potential for airborne odour at surrounding receivers.

The capital investment value for the Modification Proposal is $3,470,840 (ex. GST). It is further estimated that Modification Proposal will create 3 full time equivalent jobs in the construction phase over a 7 month period, and 0.5 full time equivalent jobs during the operational phase.

Given the overall positive environmental contribution expected from the Modification Proposal, the application is recommended for approval.

CONTENTS

1. Introduction

Dial-A-Dump Industries (EC) Pty Ltd (a fully owned subsidiary of Bingo Industries Ltd) (**DADEC**) is the operator of the Eastern Creek Recycling Ecology Park (REP) (the Facility), located at 1 Kangaroo Ave, Eastern Creek NSW. The original project approval for the Eastern Creek REP was granted by the Minister for Planning in 2009 (MP 06_0139) under Section 75J of the *NSW Environmental Planning and Assessment Act* 1979 (EP&A Act). Following the repeal of Part 3A of the EP&A Act on 1 October 2011, the project was subject to the transitional arrangements provided by the *Environmental Planning and Assessment Regulations* 2000 (EP&A Regulations). The transitional arrangements provided by EP&A Regulations have now ceased, and the project was transitioned to a State Significant Development (SSD) on 2nd October 2020.

Consequently, MP06_0139 is now considered to be SSD and this Modification Proposal application has been prepared pursuant to Section 4.55 (1A) of the EP&A Act.

Operations at the Facility commenced in 2012 and the project approval has since been modified eight times, most recently in March 2021 (Mod 8). Under MP 06_0139 (and subsequent development modifications), the Facility is approved for the following activities:

- A throughput capacity of 2,000,000 tonnes per annum (tpa) of non-putrescible waste;
- Of the 2,000,000 tpa accepted, landfilling in the quarry void up to 1,000,000 tpa of non-putrescible waste (including asbestos and other non-recyclable waste);
- Materials processing centres (MPC1 and MPC2) which recover recyclable material from comingled commercial and industrial and construction and demolition waste;
- Crushing, grinding and separating works to process waste masonry material;
- Stockpiles for 50 tonnes of tyres; and
- Stockpiles for 20,000 tonnes of green waste.

The facility operates under two Environment Protection Licences (EPL) issued by the NSW Environment Protection Authority (EPA). These include:

- EPL No. 20121, which relates to the recycling and resource recovery arm of the operation; and
- EPL No. 13426, which relates to the management and regulation of the general solid waste (non-putrescible) landfill operation including Special Waste (asbestos).

The Modification Proposal seeks to build on the success of the temporary landfill gas collection and treatment system. In a recent Senate estimates hearing, a representative of NSW EPA stated that a dramatic reduction in odour complaints was experienced following the installation of the temporary flare system, with monitoring of hydrogen sulphide around the premises indicating that concentrations were observed to “pretty much go to zero”. The installation of the permanent flare system will generate further air quality improvements as supported by air quality assessment undertaken for the Modification Proposal.

The Modification Proposal seeks to capture up to 85 percent of generated landfill gas, and combust this gas with 98 percent destruction efficiency within two permanent, enclosed flares at a rate of 3 000 standard cubic metres per hour (50 percent more than the current temporary system). The proposed flares to be installed are Run Energy model OEF-300. The flares will be approximately 8m high and located approximately 50m northeast of the Materials Processing Centre 1.

The flares have been designed to be achieve the requirements as set out by NSW Environment Protection Authority, through the *‘Environmental Guidelines for Solid Waste Landfills’ (2016), the Protection of the Environment Operations Act 1997*, and the *Protection of the Environment (Clean Air) Regulation 2021*. The flares would also be constructed, installed and operated in accordance with relevant Australian Standards.

Additional works required to support the flares include:

- Construction of a 19m x 34m engineered hardstand area for supporting the landfill gas flare flares;
- Construction of a stainless-steel condensate knockout pot;
- Erection of a 1.8m high palisade security fence around the flare units and surrounding area (total 45m x 45m);
- Construction of a 450 mm main header line to connect the permanent flare; and
- Decommissioning of the temporary flares that have been installed to address odours issues.

The following works are also required, though these works are within the scope of the original approval under MP06_0139. As a result, the impacts of these works have not been considered further in this SEE:

- Replacement of a portion of the existing 160mm header line with a new 355mm header line;
- Extension of the LFG network through the installation of additional 355mm header line;
- Construction of in-line barometric condensate traps to remove any condensate build up; and
- Remedial works in order to compact the clay liner back to its previous state (approved under MP06_0139).

As part of the original approval, the environmental assessment documentation supporting MP06_0139 includes scope for a landfill gas collection infrastructure. Section 9.5.2 of the supporting environmental assessment document entitled "Light Horse Business Centre: Volume 1 – Environmental Assessment Report" provides relevant detail on landfill gas management at Eastern Creek. In summary, the approval provides the installation of horizontal and vertical pipes to enable the collection of gas if required. This application therefore does not consider the impacts of the gas collection system given it is already approved under MP06_0139. Schedule 3, Conditions 36 and 37 of the Project Approval also anticipate the requirements for a landfill gas treatment system as follows:

- Condition 36 (b) – Greenhouse gas emissions – the proponent shall implement all reasonable and feasible mitigation measures to minimise the scope 1, 2 and 3 greenhouse gas emissions produced on site, to the satisfaction of the Secretary; and
- Condition 37 (h) - Air Quality, Odour and Greenhouse Gas management plan for the site requires a protocol for remediating uncontrolled landfill gas emissions.

Under the variation of EPL 13426, issued on 10 September 2021, Condition U1 was added under Pollution Studies and Reduction Program. Condition U1.2(b) requires the Licensee to submit all required documentation to the Department of Planning, Industry and Environment (DPIE) to implement and commission the proposed permanent flaring system by 30 November 2021.

1.1 The proponent

The proponent details in relation to the Modification Proposal are:

- Full name(s): Dial-A-Dump Industries (EC) Pty Ltd
- Postal address: PO Box 7, Enfield NSW 2136
- ABN: 761 153 457 69
- Nominated contact: Brad Searle - Environment, Approvals and Regulatory Compliance Manager
- Contact details: 0408 204 054, brad.searle@bingoindustries.com.au
- Site owner(s): Dial-A-Dump (EC) Pty Ltd

The site owner's letter of consent is contained in Appendix 1.

1.2 Planning pathway overview

The Eastern Creek Recycling Ecology Park was originally approved (MP 06_0139) under Part 3A (now repealed) of the Environmental Planning and Assessment Act 1979 (EP&A Act) and the project was transitioned to a State Significant Development (SSD) on 2 October 2020. Consequently, MP06_139 is now considered to be SSD.

The DPIE has advised that the assessment of the proposal will be performed under a s4.55(1a) of the *Environmental Planning and Assessment Act* 1979. This approval pathway was confirmed in writing with the DPIE on 9 September 2021.

The Modification Proposal is considered minor and is not expected to be associated with any additional environmental impacts. The installation of the LFG flare will provide positive benefits to the environment by way of reducing greenhouse gas emissions and the potential for the dispersion of odour gases to nearby sensitive receivers.

1.3 SEARs requirements and checklist

The DPIE confirmed in writing on 9 September 2021 that the matters provided in Table 1.1 (SEARs requirements) are to be addressed in a Statement of Environmental Effects (this report). Table 1.1 provides a chapter reference where each of these matters have been addressed.

Table 1.1 Matters addressed in this Statement of Environmental Effects and report section reference.

Requirement	Information Required	Report Section Reference
Description of the modification	• A detailed description of the proposed modification, including the location and height of the flare structure, the location of any associated infrastructure and the extent of earthworks/civil works. • Identification of conditions to be modified and proposed wording of any new or modified conditions. • Identification of any proposed variations to other licences and approvals.	**Section 3** **Section 11**
Details of the existing operations on site	• A description of how the proposed modification relates to the existing and approved operations/facilities, including licences or statutory approvals that apply to these. • A summary of the existing conditions of consent that would be relevant to the proposal. • A summary of the existing environmental management and monitoring regime. • Detailed plans of the existing and proposed site layout and structures.	**Section 2 / Section 4**
Assessment of the modification	• A detailed assessment of the key issues specified below and any other Significant issues identified by a risk assessment, which includes: ○ An assessment of all potential impacts of the proposal on the Existing environment and measures to avoid, minimise, mitigate and/or manage these potential impacts, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment. ○ An assessment of the potential impacts of all stages of the development, including any cumulative impacts of the proposal with the existing operations on site.	**Section 7** **Section 9** **Section 8**
Strategic and statutory context	• The need and justification for the proposal having regard to its location and impacts, the suitability of the site and the public interest. • Consideration of all relevant legislation, strategies, environmental planning instruments, including identification for any inconsistencies justification the proposal is substantially the same development as the development to which consent was originally granted, as per s4.55(1a) of the EP&A act.	**Section 5**
Air quality	• A quantitative Air Quality Impact Assessment (AQIA) of the potential air quality, dust and odour impacts of all stages of the modification (construction and operation) in accordance with the relevant Environment Protection Authority guidelines, including an assessment of cumulative impacts. • A greenhouse gas assessment. • Details and results of the landfill gas extraction trial. • Details of proposed mitigation, management and monitoring measures.	**Section 7.1**
Visual	• A detailed description of the flare stack and an assessment of the potential impacts of the flare stack on the amenity of the surrounding area.	**Section 7.7**
Noise and vibration	• A quantitative assessment of potential construction and operational noise and vibration impacts in accordance with relevant Environment Protection Authority guidelines and including details of the proposed on-going monitoring regime to be implemented.	**Section 7.2**
Hazard and risk	• A preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33* (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (DoP, 2011) and *Multi-Level Risk Assessment* (DoP, 2011).	**Section 7.3**

Requirement	Information Required	Report Section Reference
Fire and incident management	• Technical information on any additional environmental protection equipment to be installed on the premises.	**Section 7.3.5**
Soil and water	• An assessment of any impacts on existing stormwater infrastructure.	**Section 7.4**
Biodiversity	• An assessment of biodiversity impacts in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR) or justification that a BDAR is not required as the proposal will not increase the impact on biodiversity values as per Clause 7.17(2)(c) of the *Biodiversity Conservation Act* 2016.	**Section 7.5**
Aboriginal cultural heritage	• An Aboriginal Cultural Heritage Assessment Report if any works associated with the proposed modification extend beyond the 'Operational Area' of the development (Appendix 3 of the consent).	**Section 7.6**
Consultation	• Consultation with the Environment Protection Authority, and if required, any other relevant local, State or Commonwealth Government authorities, service providers, community groups.	**Section 6**
Summary Table	• A table indicating where each element of the SEARs is addressed in the modification application.	**Table 1.1**

2. Site description

Eastern Creek REP (the Site) is located at 1 Kangaroo Avenue Eastern Creek and comprises two lots (Lot 1 DP 1145808 and Lot 2 DP 1247691 with a total area of 52 Ha (refer to Figure 2.1).

The Site is located in the Western Sydney Employment Area and development at the site is controlled by the State Environmental Planning Policy (Western Sydney Employment Area) 2009 (refer to Figure 2.2). The SEPP includes a number of precincts. Development in each precinct will help create future employment and growth in the area.

The Site is located on land zoned IN1 General Industrial under the *State Environmental Planning Policy (Western Sydney Employment Area)* 2009 (Figure 2.3).

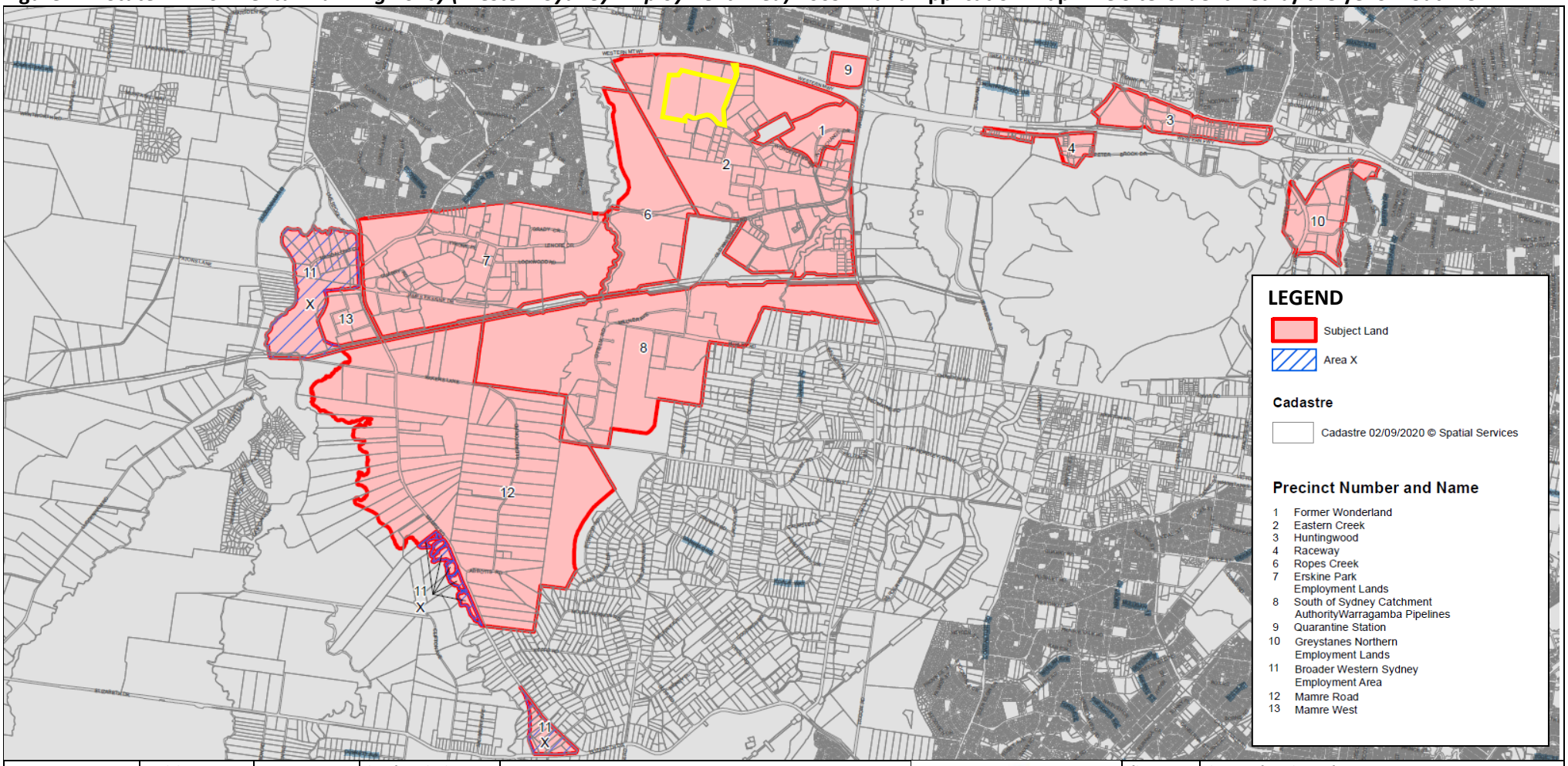
The Site is surrounded by areas of vacant land to the east and southeast as well as other commercial and industrial land uses such as warehousing and an asphalt batching plant. Residential areas are located to the north (Minchinbury) and west (Erskine Park).

Access to the Site is from Kangaroo Avenue which connects to Honeycomb Drive to the south and allows access to the M4 and M7 motorways.

Figure 2.1. The Eastern Creek Recycling Ecology Park located at 1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691). The Site is identified by the blue shading.

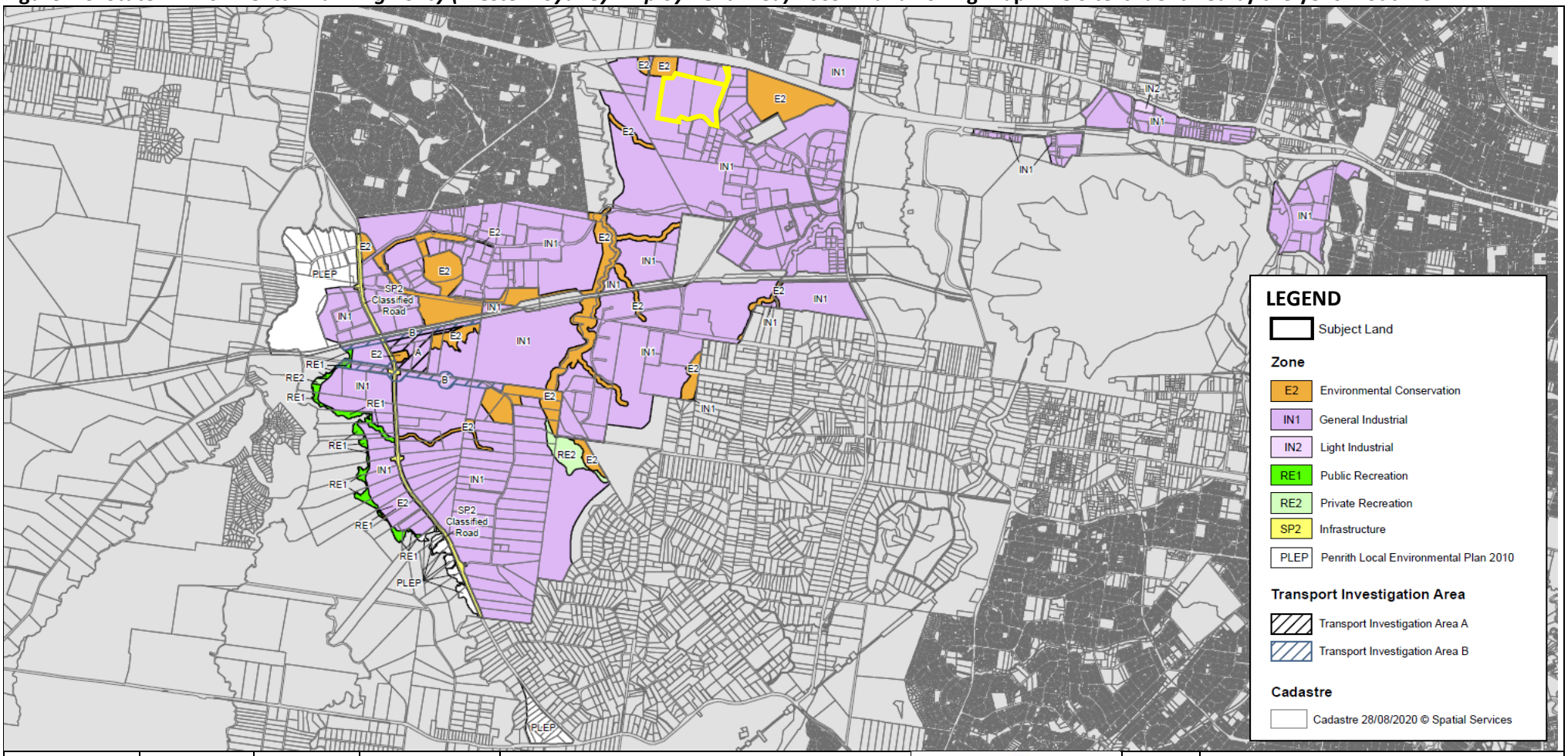
Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd		Client	Bingo Industries Ltd
11/10/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au		Project	Permanent gas flare
						Title	Site layout and access route
						Scale	As shown
						Source	Nearmap

Figure 2.2. ***State Environmental Planning Policy (Western Sydney Employment Area)*** **2009 – Land Application Map. The Site is identified by the yellow outline.**



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd		Client	Bingo Industries Ltd
11/10/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au		Project	Statement of Environmental Effects
						Title	WSEA SEPP - Land Application Map
						Scale	As shown
						Source	Department of Planning, Industry and Environment

Figure 2.3. ***State Environmental Planning Policy (Western Sydney Employment Area)*** **2009 – Land Zoning Map. The Site is identified by the yellow outline.**



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd	Client	Bingo Industries Ltd
11/10/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	Project	Statement of Environmental Effects
					Title	WSEA SEPP - Land Zoning Map
					Scale	As shown
					Source	Department of Planning, Industry and Environment

2.1 Site history and approvals

The Eastern Creek REP site was cleared in the 1800s for agricultural use and subsequently blue metal was quarried in the area, after about 1829. Pioneer commenced major quarrying at the Site in the 1930s, with Ray Fitzpatrick Quarriers occupying the Site around 1950. Pioneer then operated the quarry until September 2006. The landfill (former quarry) comprises approximately 75% of the Site area.

The original project approval for the Site was granted by the Minister for Planning in 2009 (MP 06_0139) under Section 75J of the *NSW Environmental Planning and Assessment Act* 1979 (EP&A Act). The operations commenced in 2012 and the project approval has been modified eight times, most recently in March 2021.

A list of consents and approvals for the facility is provided in Table 2.1 below.

Table 2.1. Summary of consents and approvals operating at 1 Kangaroo Avenue Eastern Creek.

Approval type	Date issued	Summary of approval
Original project approval (MP06_139)	22 November 2009	• A waste recovery facility including a Class 2 (non-putrescible) landfill; • Total throughput of 2 million tonnes per annum; • Landfilling of up to 700,000 tonnes per annum of non-putrescible waste including asbestos; • Stockpiling of up to 50 tonnes of tyres at any one time; and • Stockpiling of up to 20,000 tonnes of green waste at any one time.
Modification 1	30 September 2010	• Installation of conveyor and chute; • Permit two-way traffic on Fourth Avenue; • Construction of concrete bay walls within the Greenwaste Processing Area; and • Relocation of the wheelwash.
Modification 2	9 November 2010	• Administrative amendment to correct the land (lot and DP) to which the project applies

Modification 3	5 December 2011	• Amendments to final landform level of the fill pad at Area D;
		• Revision of operational landform levels and the Site's stormwater design;
		• Revision of the Voluntary Planning Agreement (VPA);
		• Retrospective approval of various buildings/structures, including:
		  ○ Additional internal office and external amenities at the weighbridge;
		  ○ New administration and amenities buildings; and
		  ○ Relocation of the vehicle turning bay.

Modification 4	14 December 2013	• Extension of the operational hours for the MPC.
Modification 5	17 March 2016	• Construction of an additional pre-sort enclosure (PSE) adjacent to the MPC.
Modification 6	29 April 2020	• Increase the proportion of the annual waste receival limit that can be landfilled from 700,000 to 1,000,000 tpa; • Extension of the operating hours of certain activities; and • Amend the noise limits.
Modification 7	Withdrawn on the 12 July 2019 following the	• Proposed modifications to the Site entry point and the Site layout.

Approval type	Date issued	Summary of approval
	acquisition of Dial-A-Dump Industries (EC) Pty Ltd by Bingo Industries Ltd	
Transition to State Significant Development	2 October 2020	Following the repeal of Part 3A of the EP&A Act on 1 October 2011, the project was subject to the transitional arrangements provided by the Environmental Planning and Assessment Regulations 2000 (EP&A Regs). The transitional arrangements provided by EP&A Regs have now ceased, and the project has been transitioned to a State Significant Development (SSD) on 2nd October 2020.
Modification 8	3 March 2021	• Convert the Pre-Sort Enclosure to a second Materials Processing Centre; and • Relocate car parking and weighbridges.

2.2 Current approved site activities

The Site is currently approved for the following activities:

- A throughput capacity of 2,000,000 tonnes per annum (tpa) of non-putrescible waste;
- Of the 2,000,000 tpa accepted, landfilling in the quarry void up to 1,000,000 tpa of non-putrescible waste (including asbestos and other non-recyclable waste);
- Materials processing centres (MPC1 and MPC2) which recover recyclable material from comingled commercial and industrial and construction and demolition waste;
- Crushing, grinding and separating works to process waste masonry material;
- Stockpiles for 50 tonnes of tyres; and
- Stockpiles for 20,000 tonnes of green waste.

2.3 Current landfill gas management

The installation of the current temporary infrastructure for the extraction of LFG at the Premises commenced on 15 May 2021, with an LFG pumping trial commencing on 17 May 2021 at the Premises. The pumping trial required the progressive installation and operation of an LFG extraction system, initially with 15 LFG extraction wells and a single flare (extracting and treating by combustion 500 standardised cubic metres per hour (gas volume standardised to 15 ° C) (Sm^3/hr) of LFG). A second flare (treating by combustion 800 Sm^3/hr of LFG) was commissioned on 26 May 2021 with an additional six LFG wells in operation, plus a connection to the leachate riser.

The pumping trial LFG extraction system was expanded with the installation of another six LFG wells and a horizontal well at the leachate riser, which was completed on 29 May 2021. A third flare (treating by combustion 500 $Sm^{3}\cdot$ hr-1 of LFG) was commissioned on 11 June 2021 and a fourth flare (treating by combustion 500 Sm^3/hr of LFG) became operational in October 2021 with an additional four wells, totalling 31 gas wells. One temporary flare was offsite for servicing in October 2021 and returned to operation on 30 November 2021.

The temporary gas collection system and temporary LFG flares are located at the surface of the landfill as shown in Figure 2.4. The system extracts landfill gas from areas of identified elevated LFG emissions along the northern waste / sidewall interface and the main leachate sump area of the landfill. Prior to the system being in operation, all LFG was emitted uncontrolled through surface release to atmosphere.

Further information on the history of the LFG extraction system is provided in Section 4.

Figure 2.4. Temporary LFG extraction system layout as currently installed (as of November 2021) under MP06_139.

Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd		Client	Bingo Industries Ltd
19/11/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 20 60 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	JACKSON ENVIRONMENT AND PLANNING STRATEGY | INFRASTRUCTURE | COMPLIANCE | PROCUREMENT	Project	Statement of Environmental Effects
						Title	Current temporary LFG extraction system
						Scale	As shown
						Source	Run Energy

2.3.1 Operational hours

The existing operational hours are summarised in Table 2.3.

Table 2.3. Existing approved operational hours.

Activity	Day	Time
Construction	Monday - Friday	7:00am to 6:00pm
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	Nil
MPC and PSE – Operation, waste receival, chute use and maintenance	Monday - Friday	24 hours
	Saturday	24 hours
	Sunday and Public Holidays	24 hours
SMA – Crushing and screening	Monday - Friday	6:00am to 6:00pm
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	8:00am to 4:00pm
SMA – Receipt of segregated materials	Monday - Friday	24 hours
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	8:00am to 4:00pm
Landfill – Truck deliveries	Monday - Friday	5:00am to 9:00pm
	Saturday	5:00am to 9:00pm
	Sunday and Public Holidays	5:00am to 9:00pm

3. Modification Proposal

The Modification Proposal involves the following works:

- Installation of two 1,500 m^3/hr high temperature, fully enclosed landfill gas (LFG) ground flares and supporting infrastructure;
- Construction of a 19m x 34m engineered hardstand area for supporting the landfill gas flare flares;
- Construction of a stainless-steel condensate knockout pot;
- Erection of a 1.8m high palisade security fence around the flare units and surrounding area (total 45m x 45m);
- Construction of a 450 mm main header line to connect the permanent flare; and
- Decommissioning of the temporary flares that have been installed to address odours issues.

The following works are also required, though these works are within the scope of the original approval under MP06_0139. As a result, the impacts of these works have not been considered further in this SEE:

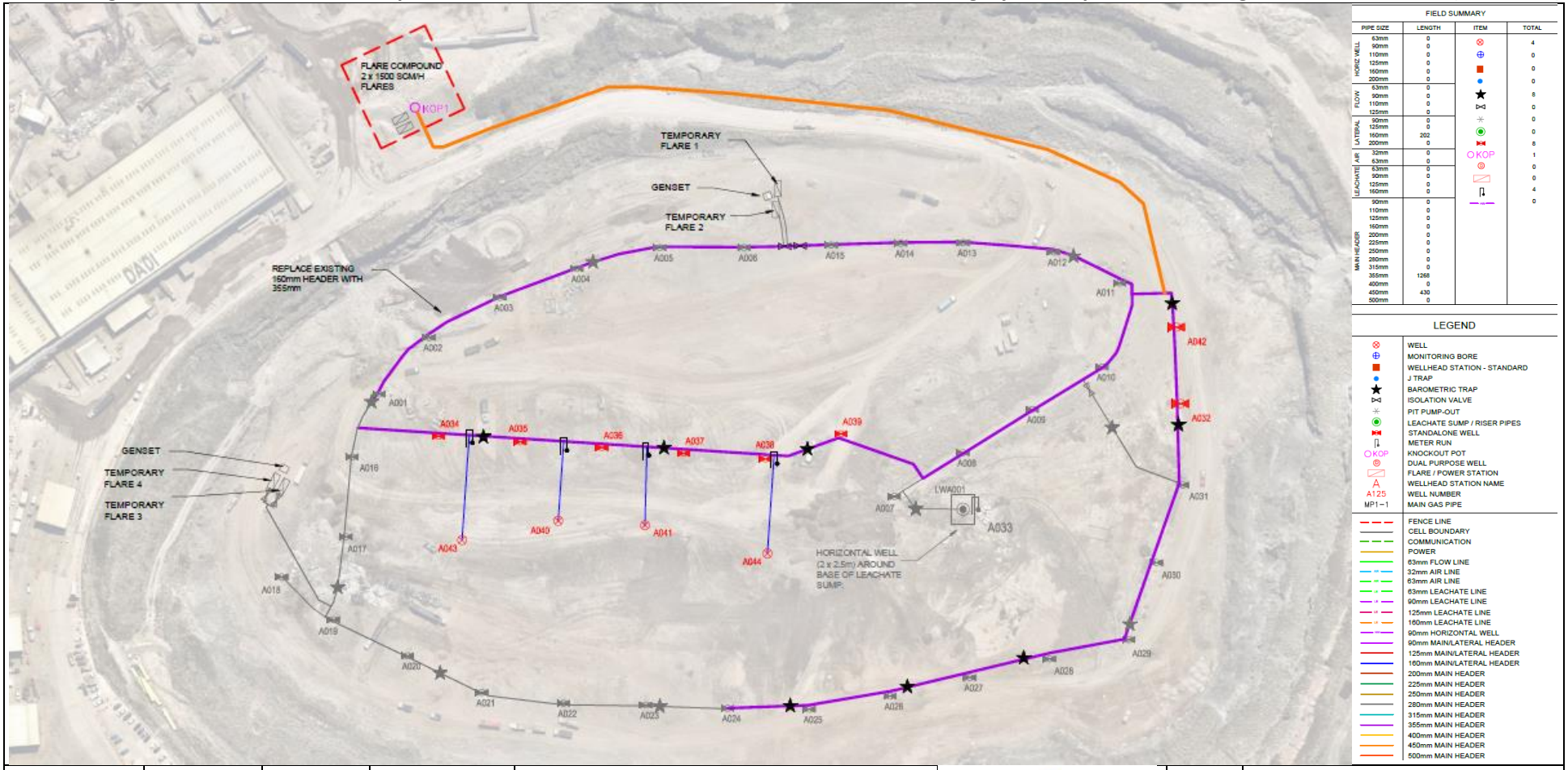
- Replacement of a portion of the existing 160mm header line with a new 355mm header line;
- Extension of the LFG network through the installation of additional 355mm header line;
- Construction of in-line barometric condensate traps to remove any condensate build up; and
- Remedial works in order to compact the clay liner back to its previous state (approved under MP06_0139).

The proposed flares to be installed are Run Energy model OEF-300. An example of the flare is provided in Figure 3.1. The flares will be approximately 8m high and located approximately 50m northeast of MPC1 (refer to Figure 3.2). Figure 3.3 provides a general arrangement of the flare compound.

High-definition plans are contained in Appendix 2.

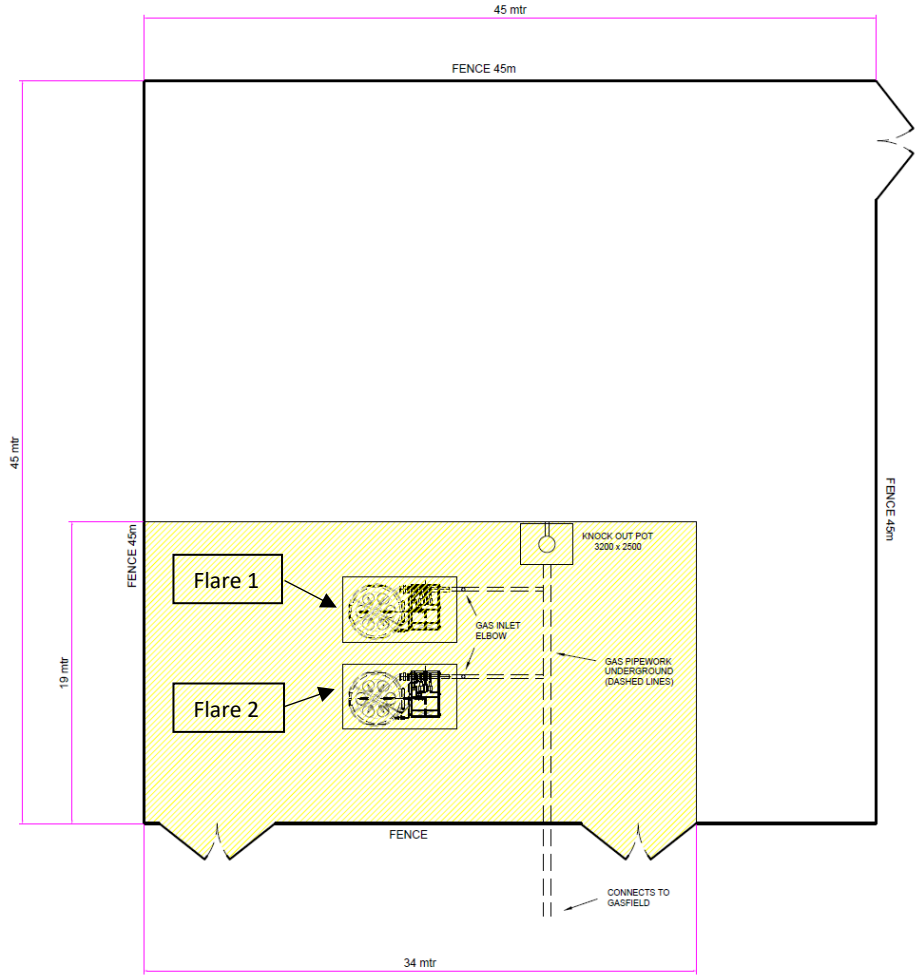
Figure 3.1. Example of the model OEF-300 flare installed for Harvey Beef, Western Australia.

Figure 3.2. Proposed permanent flare compound location (red dashed line). The orange line depicts the proposed 450mm main header line. The purple line depicts the existing 160mm header line to be replaced and extended with a new 355mm header line. The grey line depicts the existing 280mm header line (to remain).



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd	Client	Bingo Industries Ltd
22/10/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	Project	Permanent gas flare
					Title	Flare and header line installation layout
					Scale	As shown
					Source	Bingo Industries Ltd

Figure 3.3. LFG flare compound layout.



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd	Client	Bingo Industries Ltd
22/10/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	Project	Permanent gas flare
					Title	Gas flare compound layout
					Scale	As shown
					Source	Bingo Industries Ltd

3.1 Infrastructure requirements

The following sections provide further information on the key elements of the project.

3.1.1 Flare design

The modification proposal involves the installation of two (2) 1,500 m^3/hr high temperature, fully enclosed ground flares (Run Energy model OEF-300). The flares are designed to incinerate biogas with a methane composition between 10-60% and in accordance with the relevant Australian and international standards, including:

- Australian Standard AS 1375 *Industrial Fuel-Fired Appliances*;
- Australian Standard AS 5601 *Gas Installations*;
- Australian Standard AS 3814 *Industrial and Commercial Gas Fired Appliances*;
- *Dangerous Substances and Explosive Atmospheres Regulations* 2002;
- Implementing the Chemical Agents Directive 98/24/EC (CAD); and
- The Explosive Atmospheres Directive 99/92/EC (ATEX 137).

Australian Standard AS 3814 *Industrial and Commercial Gas Fired Appliances* specifies the uniform minimum requirements for the design, construction and safe operation of Type B appliances that are intended for use with town gas, natural gas, simulated natural gas, liquefied petroleum gas and tempered liquefied petroleum gas or any combination of these gases either together or with other fuels. These include:

- Requirement for test points;
- Systems for methane level detection;
- Flash back protection;
- Overtemperature protection; and
- Fully reliable flame monitoring system to enable 24-hour operation and 24-hour monitoring.

The Run Energy model OEF-300 flares are also fitted with the following standard safety features:

- Safety programable logic controller with safety interlocks for start-up;
- Double block and bleed valves with auto shut off (refer to Figure 3.4 below);
- Flame detect / UV sensors; and
- Dual control systems (independent controls on each flare).

The double block slam shut valves remains open. In the event that pressure exceeds the permissible limit, the slam shut-off valves immediately shut off the flow to the flare.

3.2 Operational Aspects

3.2.1 Ancillary infrastructure

Ignition is established using a Liquid Petroleum Gas (LPG) pilot. The flares will be connected to an existing three phase power source.

Using a Positive Displacement (PD) blower, biogas is extracted from the gas wells (via a stainless-steel header line embedded in the landfill site) at a rate of 1,500 m^3/hr per flare. The methane analysers and flow meters work in conjunction with the PD blower to draw in the correct of amount of gas for each component.

The flares will be automatically and remotely controlled using the Horner flare Programmable Logic Controller (PLC) and will have automatic shutdown and restart with remote dial in telemetry.

Before entering the the flares, biogas is drawn through a stainless-steel condensate knock-out pot to ensure that no airborne liquids can pass into the flares.

Figure 3.4. provides the LFG flare general arrangement.

3.2.2 Flow lines

The flares will be connected to the existing gas collection network via a 450 mm main header line (depicted in orange in Figure 3.2 above). A portion of the existing 160mm header line is to be replaced with a new 355mm header line (depicted in purple in Figure 3.2 above). Further extension of the LFG network will be done through the installation of a 355mm header line to connect to 12 additional wells (not included in this scope – refer to Section 3.3).

The existing 280mm header line is to remain and will be connected to the new 355mm header line (depicted in grey in Figure 3.2 above).

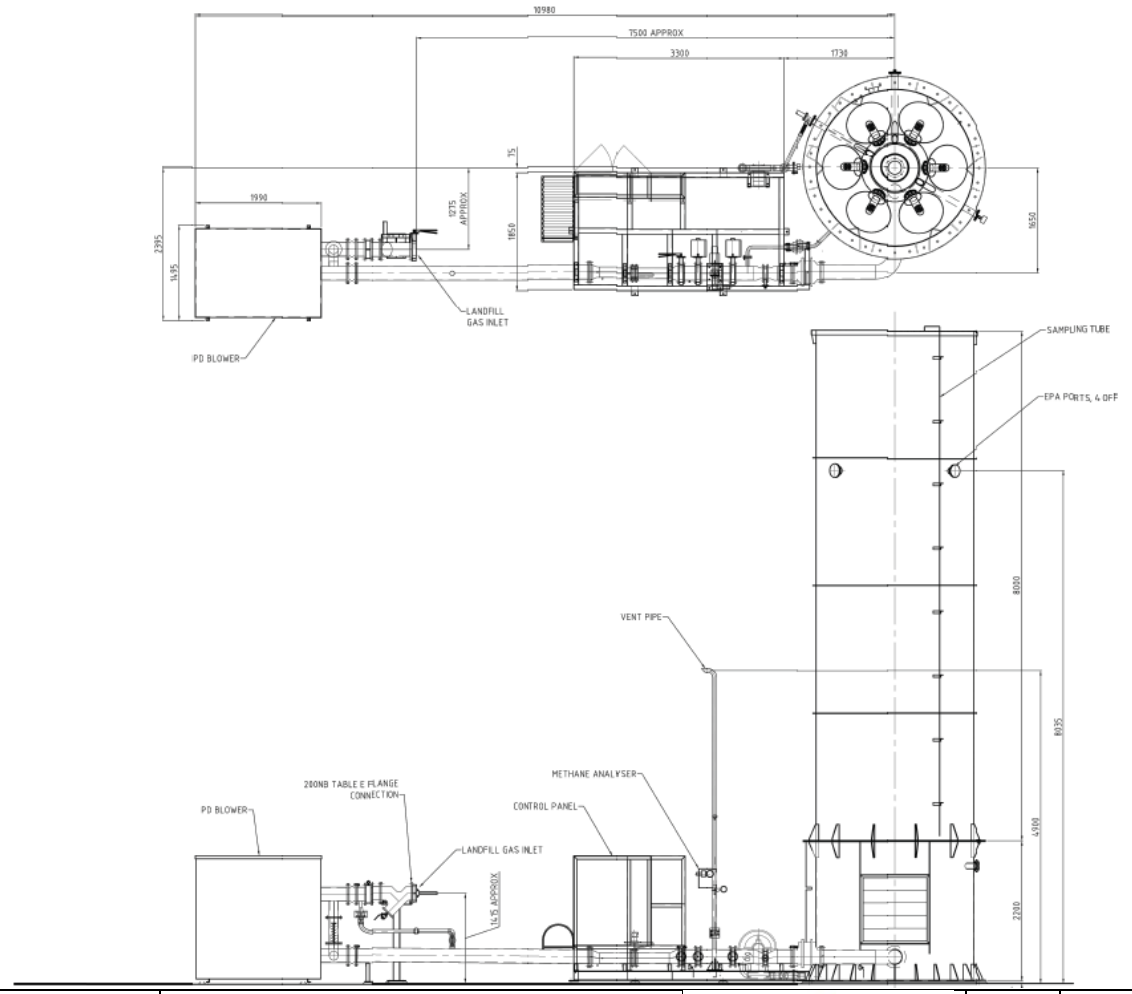
All pipework will be manufactured from stainless steel.

3.2.3 Condensate management

Eight (8) barometric condensate traps (depicted by stars in Figure 3.2 above) will be installed in new portion of the 355mm header line to passively remove any condensate build up within the main header line along the collection network (refer to Figure 3.5). The flow lines will be laid so that condensate can fall back to the wells or to a condensate trap. The length of the lines will be minimised to reduce the likelihood of introducing low points, friction loss and build-up of condensate.

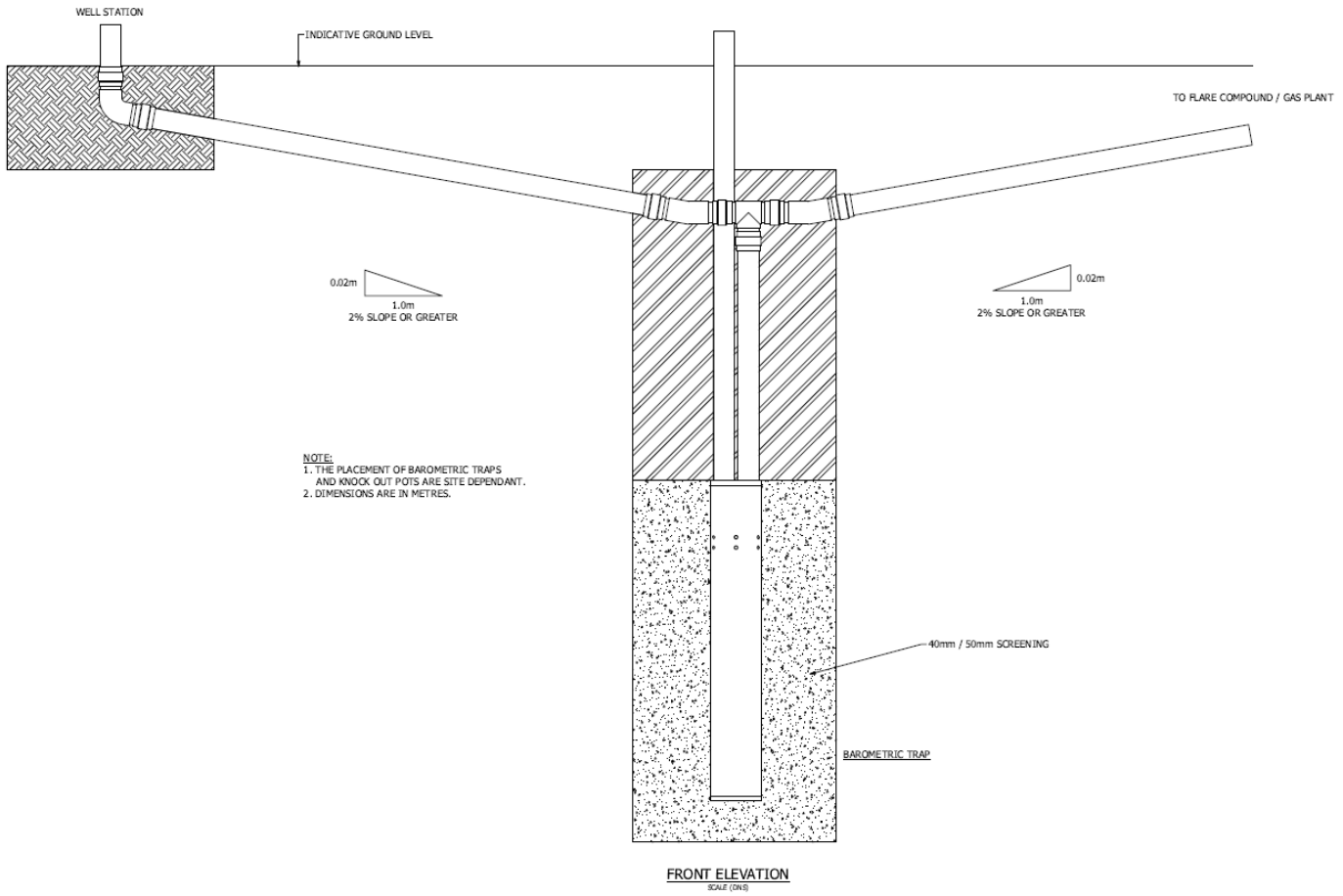
Condensate will not be collected or discharged to the surface of the landfill.

Figure 3.4. LFG flare general arrangement.



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd		Client	Bingo Industries Ltd
22/10/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au		Project	Permanent gas flare
						Title	Gas flare compound general arrangement
						Scale	As shown
						Source	Bingo Industries Ltd

Figure 3.5. Barometric trap layout.



Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd		Client	Bingo Industries Ltd
22/10/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	JACKSON ENVIRONMENT AND PLANNING STRATEGY | INFRASTRUCTURE | COMPLIANCE | PROCUREMENT	Project	Permanent gas flare
						Title	Barometric trap layout
						Scale	As shown
						Source	Bingo Industries Ltd

3.3 Construction works

3.3.1 Flare and flare compound installation

An excavator and small crane will be used to construct the concrete base slab and install the flare unit. The concrete base slab works are minor in nature and will take approximately one week to complete. The installation and connection of the flare, including commissioning and pressure testing to ensure performance requirements are met, is expected to take up to two weeks to complete.

3.3.2 Flow lines

An excavator and small crane will be used to install ~600 m of leachate return line (over two stages); ~400m of 450 mm main header line (over two stages) and 1.2km of 355 mm main header line (one stage). The landfill cap will be excavated / trenched to appropriate installation depths.

Installation of the leachate return lines and main header lines will be undertaken in accordance with the *Environmental Guidelines – Solid Waste Landfills* (NSW EPA, 2016, 2nd Edition). The following international guidelines will also be referred to:

- UK Environment Agency *Guidance on Pumping Trials to Determine Whether Installation of Gas Flaring Systems at Landfill Sites Can Be Justified* (2005);
- UK Environmental Agency *Guidance on Landfill Gas Management* (2004);
- UK Environmental Agency *Guidance on Landfill Gas Flaring* (2002);
- Waste Management Industry *Drilling into landfill waste, Industry Code of Practice* (2006); and
- Industry Guidance Code Practice *Perimeter Soil Gas Emission Criteria and Associated Management* (2011).

Remedial works will be progressively carried out after excavation of the landfill cap, in order to compact the clay liner back to its previous state.

3.3.3 Decommissioning works

As part of the development, the four existing temporary LFG flares will be decommissioned and stored in the event that they may need to be deployed in future.

3.3.4 Construction hours

Construction will be carried out within the approved construction hours as shown in Table 3.1.

Table 3.1. Existing approved construction hours under MP06_139.

Hours	Currently Approved
Monday – Friday	7:00am to 6:00pm
Saturday	8:00am to 4:00pm
Sunday and public holidays	Nil

Construction works outside these construction hours may be undertaken in the following circumstances:

- The delivery of materials required outside the standard construction hours for safety reasons; or
- Where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

3.3.5 Works program

Subject to the Modification Proposal approval, supply of materials and weather delays, it is anticipated that installation works will be completed over a period of approximately 6 months, which is expected to include mobilisation and demobilisation at commencement and completion respectively (refer to Table 3.2). The delivery of the flare is expected to incur a lead time of 6 months from procurement (explaining the gap in the works program between Month 2 and 7 in Table 3.2).

Table 3.2. Estimated works program.

Task	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
Butt weld well pipes							
Trench, weld and lay 1.2km of 355 mm main header line							
Install 8 new barometric traps							
Connect 8 new barometric traps into 355 mm main header line							
Complete well head connections							
Trench, weld and lay 202m x 160 mm lateral header line							
Trench, weld and lay 2 x 45 m x 450 mm main header line							
Weld and lay 295 m x 450 mm main header line							
Install 600 m of leachate return line							
Install knock out pot							
Construct flare compound							
Install flare (delivery of Flare ~28th June 2022)							

3.3.6 Site access and egress

The construction works will utilise Kangaroo Avenue via Honeycomb Drive for access to and egress from the construction area (refer to Figure 3.6).

3.3.7 Remedial works

Remedial works will be progressively carried out after excavation of the landfill cap, in order to compact the clay liner back to its previous state.

Figure 3.6. Site access and egress.

Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	Client	Bingo Industries Ltd
11/10/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)		Project	Permanent gas flare
					Title	Site access and egress
					Scale	As shown
					Source	Nearmap

3.4 Proposed operating hours

The proposed operational hours are summarised in Table 3.3. All currently approved operating hours will remain unchanged with the exception of the permanent flares which would operate on a 24hrs per day, 7 days per week basis.

The permanent flare operation will need to potentially operate on a 24/7 basis to manage landfill gas on a continuous basis. The impacts of this has been considered in the SEE and relevant changes to conditions of consent are further provided in Section 11.

Table 3.3. Proposed operational hours.

Activity	Day	Time	Change
Construction	Monday - Friday	7:00am to 6:00pm	No change
	Saturday	8:00am to 4:00pm	No change
	Sunday and Public Holidays	Nil	No change
MPC and PSE – Operation, waste receival, chute use and maintenance	Monday - Friday	24 hours	No change
	Saturday	24 hours	No change
	Sunday and Public Holidays	24 hours	No change
SMA – Crushing and screening	Monday - Friday	6:00am to 6:00pm	No change
	Saturday	8:00am to 4:00pm	No change
	Sunday and Public Holidays	8:00am to 4:00pm	No change
SMA – Receipt of segregated materials	Monday - Friday	24 hours	No change
	Saturday	8:00am to 4:00pm	No change
	Sunday and Public Holidays	8:00am to 4:00pm	No change
Landfill – Truck deliveries	Monday - Friday	5:00am to 9:00pm	No change
	Saturday	5:00am to 9:00pm	No change
	Sunday and Public Holidays	5:00am to 9:00pm	No change
Permanent landfill gas flare operation	Monday - Friday	24 hours	24 hours
	Saturday	24 hours	24 hours
	Sunday and Public Holidays	24 hours	24 hours

3.5 Supporting infrastructure covered under scope of existing approval

In addition to the existing 31 wells currently installed on the Site, twelve (12) additional gas collection wells will be installed under the existing MP06_139 approval. The installation of the additional wells is not included in the Scope of Works for the Modification Proposal or covered by this Statement of Environmental Effects.

The wells will be installed at the following approximate depths (subject to the Site conditions):

- 10 x 32m; and
- 2 x 18m.

These are shown in red in Figure 3.2.

Meter run well heads complete with sampling and flow measuring ports will be installed at the 12 addition gas collection wells. The 12 additional wells will be connected to the LFG network through the installation of a 355mm header line (refer to Section 3.1.3).

These works will be carried out between December 2021 early February 2022 and will take approximately one week to complete.

4. Project justification

4.1 Background

Prior to 2021 the Eastern Creek REP historically had received few odour complaints that could be attributed to the Site's operational activities. In March 2021 a one in a hundred-year rain event occurred where significant volumes of water entered the landfill, increasing the potential for the production of odour.

Between 1 April and 30 July 2021, the NSW Environment Protection Authority (EPA) received more than 750 reports of odours described variously as rotten egg gas, sulphur smelling, and foul chemical smells from residents and businesses in suburbs surrounding the Facility including Minchinbury, Mt Druitt, St Clair, Erskine Park, Horsley Park and Eastern Creek.

As a result, on 23 April 2021 the EPA issued a Clean-Up Notice under section 91 of the POEO Act (Notice No. 3500173) requiring DADEC to take reasonable immediate actions to manage gas emissions from the leachate riser and leachate vent pipe. Following the issue of the Clean-up Notice, the licensee took action to seal the leachate riser and leachate vent pipe.

However, the NSW EPA continued to receive complaints of odours after the completion of these actions. The NSW EPA considered further actions were required to prevent the emission of offensive odours from the Site. On 7 May 2021 the EPA issued Licence Variation Notice No. 1608782 (to Licence 13426) to include a Special Condition in order to impose additional Licence requirements (Condition E5) to prevent the emission of potentially offensive odours from the premises.

Specifically, Condition E5.11 was imposed which supports the installation of a temporary flare system in the vicinity of the leachate riser in the south-east of the landfill to capture landfill.

The installation of the temporary infrastructure for the extraction of LFG at the Facility commenced on 15 May 2021, with an LFG pumping trial commencing on 17 May 2021 at the Eastern Creek landfill. The pumping trial required the progressive installation and operation of a LFG extraction system, initially with 15 landfill gas extraction wells and a single flare (500 m^3/hr). A second flare (800 m^3/hr) was commissioned on 26 May 2021 with an additional 6 landfill gas wells in operation plus a connection to the leachate riser. The pumping trial LFG extraction system was expanded with the installation of another 6 landfill gas wells and a horizontal well at the leachate riser. This was completed on 29 May 2021. A third flare (500 m^3/hr) was commissioned on 11 June. A fourth flare (500 m^3/hr) became operational in October 2021 with an additional 4 wells (31 in total). The location/distribution of the temporary gas collection system and LFG flares are shown in Figure 3.2.

The flares were reported as extracting a combined 1,665 m^3/hr of LFG from the landfill effective 3 November 2021. Since the commencement of the operation of the LFG extraction system, as at 3 November 2021, a calculated total of 1,153,710 m^3 of LFG has been extracted and treated by combustion in the flares.

Under the licence variation issued on 10 September 2021, Condition U1 was added under Pollution Studies and Reduction Program. Specifically, Condition U1.2(b) requires the Licensee to submit all required documentation to the DPIE to implement and commission the proposed permanent flaring system by 30 November 2021.

This Statement of Environmental Effects (SEE) has been prepared to accompany the application for the Proposed Development modification application for the installation of a permanent flaring system. The SEE has been prepared to address the SEARs provided by DPIE. This SEE discusses the likely impacts and provides an overview of operational and environmental mitigation measures. To support the preparation of the SEE specialist consultants have been commissioned to carry out assessments on air quality and noise impacts.

4.2 LFG Context

The volume of LFG generated at a landfill is directly proportional to the amount of waste within the landfill. The total volume of LFG that will be produced is dependent on the type of waste and its volume.

The rate at which LFG will be produced is influenced by:

- Moisture content and distribution;
- Waste compaction;
- Leachate management;
- Waste composition changes over time;
- pH and nutrient availability;
- Temperature; and
- Presence of limiting factors (elevated temperatures or chemical inhibitors).

LFG is a natural by-product of the decomposition of organic material in landfills. When water percolates through waste (leachate), it promotes and assists the process of decomposition by bacteria and fungi. These processes in turn releases by-products of decomposition including LFG.

By volume, landfill gas typically contains 45% to 60% methane and 40% to 60% carbon dioxide. Landfill gas also includes small amounts of nitrogen, oxygen, ammonia, sulphides, hydrogen, carbon monoxide, and non-methane organic compounds (NMOCs) such as trichloroethylene, benzene, and vinyl chloride. Table 4.1 lists "typical" landfill gases, their percent by volume, and their characteristics.

Table 4.1. Typical Landfill Gas Components (Source: Speight (2019)[1]).

Component	Percent by volume	Characteristics
Methane	45 – 60	Methane is a naturally occurring gas. It is colorless and odourless.
Carbon dioxide	40 -60	Carbon dioxide is naturally found at small concentrations in the atmosphere (0.03%). It is colorless, odourless, and slightly acidic.
Nitrogen	2- 5	Nitrogen comprises approximately 79% of the atmosphere. It is odourless, tasteless, and colourless.
Oxygen	0.1 – 1	Oxygen comprises approximately 21% of the atmosphere. It is odourless, tasteless, and colourless.
Ammonia	0.1 -1	Ammonia is a colourless gas with a pungent odour.

[1] Speight, J.G. (2019) *Unconventional gas*. In Natural Gas (Second Edition), Gulf Professional Publishing, 2019, Pp 59-98.

Component	Percent by volume	Characteristics
Non-methane organic compounds (NMOC)	0.01 – 06	NMOCs are organic compounds (i.e., compounds that contain carbon). (Methane is an organic compound but is not considered an NMOC.) NMOCs may occur naturally or be formed by synthetic chemical processes.
Sulphides	0 – 1	Sulphides (e.g., hydrogen sulphide, dimethyl sulphide, mercaptans) are naturally occurring gases that give the landfill gas mixture its rotten-egg smell. Sulphides can cause unpleasant odours even at very low concentrations.
Hydrogen	0 – 0.2	Hydrogen is an odourless, colourless gas.
Carbon monoxide	0 – 0.2	Carbon monoxide is an odourless, colourless gas.

Published literature values for the percentage of LFG that is made up of trace gases (i.e. not methane or carbon dioxide), and which give LFG its odour are less than 1%v/v and nominally around 0.5%v/v. Hydrogen Sulphide (H_2S) is one such odorous trace gas. As a trace component of LFG, detectable concentrations of H_2S can be produced by the microbial reduction of small quantities of sulphate present in the incoming waste stream at all landfills.

To reduce the environmental impact of gases that otherwise would be vented to the atmosphere, a LFG flare can be used to combust landfill gas, which in turn:

- Oxidises methane (CH_4) to carbon dioxide (CO_2), thereby reducing the greenhouse gas impact of those emissions;
- Oxidises odorous gases (such as H_2S) to less-odorous compounds; and
- Destroys the majority of non-methane volatile organic compounds present in the gas.

4.3 Strategic drivers

A number of strategic drivers support this development including:

- Reducing greenhouse gas emissions;
- Managing potential environmental risks associated with potentially offensive odour emissions associated with landfill gas emissions;
- Responding to regulatory demands in response to recent rounds of elevated odour complaints;
- Fast tracking replacement of the current temporary gas collection and flare network which has a finite level of efficacy prior to the Autumn 2022 period where weather conditions typically support increased dispersion of odour from the Site's boundary;
- Securing carbon abatement opportunities and associated revenue derived from credits; and
- Complying with regulatory requirements established under the Project Approval (MP06_0139) and EPL 13246.

A summary of other key benefits of the proposed landfill gas capture project are:

- The capture of a large proportion of LFG;
- Allows the treatment by combustion of the captured LFG, which:
    - oxidises methane (CH_4) to carbon dioxide (CO_2), thereby reducing the greenhouse gas impact of those emissions; and
    - oxidises odorous gases (such as H2S) to less-odorous compounds.
- Responding to community and regulatory requirements for the treatment of LFG emissions.

Table 4.2 below (extracted from the *Eastern Creek Recycling Ecology Park Landfill Plan* dated July 2021) outlines the objectives and targets set out for the Facility to promote effective management of landfill gas, including potentially offensive odours. As shown, the Modification Proposal is consistent with the targets and objectives of the Eastern Creek Recycling Ecology Park Landfill Plan.

Table 4.2. Eastern Creek Recycling Ecology Park (& Landfill) *Landfill Gas Management Plan* objectives and targets providing justification for the Modification Proposal.

Objective	Target
Install and commission a preliminary landfill gas extraction system to reduce odorous emissions to atmosphere	Reduce the potential for emissions of landfill gas to atmosphere and at identified point sources to an acceptable level.
Install and commission a preliminary landfill gas extraction system to reduce surface emissions of landfill gas to comply with relevant NSW EPA guidelines	Reduce to and maintain emissions of landfill gas (measured in parts per million (ppm) methane at 5cm above the landfill surface) at or below 500 ppm on intermediate and final capped areas.
Undertake a pumping trial to collect suitable data to inform design requirements of future LFG management system	Develop a system design for the Site's LFG management system based on site characteristics.
Set out procedures and responsibilities for operation and maintenance of the LFG extraction system	Maintain effective LFG extraction operation.
Set out procedures and responsibilities for monitoring the effectiveness of the gas extraction system in reducing odorous emissions	Completion of ongoing management and operational procedures to demonstrate adequate performance of the LFG management system in mitigating odorous emissions.
Set out contingency actions	Actions to be taken if the system does not perform adequately, is damaged, dangerous conditions occur or odour complaints occur related to LFG.
Set out high level medium-long term LFG management and monitoring considerations	Describe expansion of the LFG extraction system as landfilling of waste continues, for which there will be updates to this LFGMP.
Community consultation	Use the Community Reference Group as the primary vehicle to facilitate community liaison for: • effective communication during works which may affect the efficacy of the LFG management system; • determining reasonable frequency of detectable odours, and • notification of concerns or complaints.
Maintain Safe Working Conditions	Control potential emissions of LFG to acceptable workplace limits at the landfill surface and maintain emissions of landfill gas (measured in parts per million (ppm) methane at 5cm above the landfill surface) at or below 500 ppm on intermediate and finally capped areas. Contain and control migration of LFG to limit concentrations to acceptable levels in the subsurface and enclosed structures

The permanent flares will provide the Facility with future potential co-generation capabilities to reduce reliance on electricity during peak demand periods. This is commonly undertaken on landfill sites to generate electricity for either on-site consumption and / or exported to the grid on large sites where it is viable to do so.

4.4 Consent conditions relevant to the proposal

Proposed new and amended conditions of consent required to support the Modification Proposal are provided in Section 11.

5. Statutory planning and strategies

A modification to the project approval (MP 06_0139) is being sought under a Section 4.55(1a) of the *Environmental Planning and Assessment Act* 1979. This planning pathway is for changes in projects which are substantially the same as the originally approved development and involve minimal environmental impact as endorsed by DPIE.

Given that the Modification Proposal will involve minor construction work with little impact, and the net benefit is an overall reduction of methane and odour emissions from the landfill (compared to conditions prior to management of landfill gas), this planning pathway is considered appropriate.

The following sections outline the planning instruments, legislation and strategy and guidelines that is applicable to the Site and the Modification Proposal.

5.1 Statutory Commonwealth and State legislative requirements

Table 5.1 summarises the applicable commonwealth and state legislative requirements that apply to the Modification Proposal.

Table 5.1. Applicable commonwealth and state legislative requirements.

Regulatory Requirements	Considerations	Comment
***Commonwealth Environment Protection and Biodiversity Conservation Act* 1999**	The *Commonwealth Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) requires actions which are likely to have a significant impact on matters of National Environmental Significance, or which have a significant impact on Commonwealth land, to be referred to the Commonwealth Minister for the Environment for approval.	No matters of National Environmental Significance would be impacted by the Modification Proposal. As such, the Modification Proposal has not been referred to the Commonwealth Minister for the Environment and approval pursuant to the EPBC Act is not required.
***Environmental Planning and Assessment Act* 1979**	The *Environmental Planning and Assessment Act* 1979 (EP&A Act) and the accompanying Regulation provides the framework for environmental planning in NSW such as the provisions to ensure that developments which have the potential to impact the environment are subject to detailed assessment, and to provide opportunity for public involvement.	The Modification Proposal is consistent with the nominated objectives of the EP&A Act and are considered capable of fulfilling the statutory requirements. The environmental assessment has determined that the Modification Proposal is substantially the same development as the development for which consent was originally granted and involves minimal environmental impact. Therefore modification of the project approval in accordance with Section 4.55(1a) of the EP&A Act is considered to be appropriate.
***Environmental Planning and Assessment Regulation* 2000**	While the EP&A Act provides the overarching framework for the planning system in NSW, the Environmental Planning and Assessment Regulation 2000 (the EP&A Regulation) supports the day-to-day requirements of this system. It supplements the broader provisions of the Act and covers matters such as local environmental plans and development control plans, which are used by councils to manage growth and development through the use of land use zoning, development standards and other planning mechanisms. It also contains key operational	The original development has been assessed against and is consistent with the requirements of the *Environmental Planning and Assessment Regulation* 2000. The modification proposal does not seek to modify any activities on the Site that would results in additional environmental impacts to nearby residential dwellings or other sensitive receptors.

Regulatory Requirements	Considerations	Comment
	provisions relating to the development assessment and consent process, requirements associated with development contributions, and fees for planning services	
***Protection of the Environment Operations Act* 1997**	The Protection of the Environment Operation Act 1997 (POEO Act) prohibits any person from causing pollution of waters, or air and provides penalties for air, water and noise pollution offences. Section 48 of the Act requires a person to obtain an Environment Protection License from the NSW Environment Protection Authority before carrying out any of the premise-based activities described in Schedule 1 of the Act. Schedule 1 of the *Protection of the Environment Operations Act* 1997 (34) details "Resource Recovery" as an activity. Section 48 of the Act requires an Environment Protection License (EPL) from the NSW Environment Protection Authority before carrying out any of the premise-based activities described in Schedule 1 of the Act. The facility will require an Environment Protection Licence (EPL) as it will receive more than 6,000 tonnes per year, and an EPL is required under the *Protection of the Environment Operations Act* 1997.	Two Environmental Protection Licence's (EPL numbers 20121 and 13426) have been issued for the premises under Section 55 of the *Protection of the Environment Operations Act* 1997. EPL 20121 allows resource recovery processes carried out on the Site and allows for the storage of up 667,000 tonnes of waste at any one time. EPL 13426 allows a total of 1,000,000 tonnes of waste to be directed to landfill in a calendar year. An amendment to EPL 13426 to incorporate the changes proposed through the Modification Proposal will be made to the NSW EPA following the issue of the modified consent conditions.
***Protection of the Environment Operation (Clean Air) Regulation* 2010**	Regulatory requirements for the combustion of landfill gas by the use of an active gas collection system and flare unit is detailed within the (NSW EPA's Environmental Guidelines: Solid Waste Landfills (2016) and *Protection of the Environment Operations (Clean Air) Regulation* 2010 (POEO Regulation). The key air pollutants of concern from the combustion of LFG include oxides of nitrogen and sulphur, and un-combusted volatile organic compounds. The POEO Regulation requires Group 6 Treatment Plants to comply with the following conditions: Condition 49: *a) any flare operated for the treatment of air impurities is operated in such a way that a flame is present at all times while air impurities are required to be treated, and* *b) either or both of the following requirements relating to the operation of any such plant are complied with:* *i. the requirements in clauses 50 and 51,* *ii. the requirements in clause 52.* Condition 50: *(2) An enclosed ground-level flare for the treatment of landfill gas must be operated* *in such a way that the time between landfill gas entering and exiting the flare is more than 0.6 seconds.*	The pollutant discharge limits set out in the POEO Regulation will not be exceeded during operation of the Modification Proposal. Similar flare units have been approved by the NSW EPA at the Horsley Park Landfill Site, Marsden Park Landfill and the Mugga Lane Landfill. The above facilities have demonstrated compliance with the discharge limits. The AQIA has also shown that the flares can achieve compliance. Refer to Section 7.1 for further details.

Regulatory Requirements	Considerations	Comment
	(3) For the purposes of this clause, the time elapsing between an air impurity (including landfill gas) entering and exiting an afterburner or flare is to be calculated: *a) using the volumetric flow rate for the air impurity, as determined in accordance with TM-2 or CEM-6, and* *b) using a 1 hour rolling averaging period.* Condition 51: *(2) An enclosed ground-level flare for the treatment of landfill gas must be operated in such a way that the temperature for the combustion of landfill gas by the flare is more than 760°C.* *Condition 52:* *(2) An enclosed ground-level flare for the treatment of landfill gas must be operated in such a way that the destruction efficiency of the flare, in relation to landfill gas entering the flare, is more than 98%.* • *Any liquid condensed from the landfill gas shall be handled in the same manner as leachate. Because of the low pH and the potential odour it shall not be spray-irrigated.* • *The discharge point(s) from any landfill gas combustion source should be designed to promote good dispersion (i.e. by means of such factors as stack height, diameter and discharge velocity) and ensure that the ground level concentration criteria are not exceeded.* Additionally, Schedule 2 also requires that gas treatment discharge limits which are to be complied with during operations as shown below: • Hydrogen sulphide (H_2S) – 5mg/m^3 • Nitrogen dioxide (NO_2) or nitric oxide (NO) or both, as NO_2 equivalent – 350mg/m^3 • Sulfuric acid mist (H_2SO_4) or sulphur trioxide (SO_3) or both, as SO_3 equivalent – 100mg/m^3 • Volatile organic compounds as n-propane equivalent – 40mg/m^3 • Smoke (as a Group 6 category Treatment Plant) – No visible emission other than for a total period of no more than 5 minutes in any 2 hours	

5.2 Consistency with Environmental Planning Instruments

Table 5.2 summarises the applicable Environmental Planning Instruments that apply to the modification proposal.

Table 5.2. Applicable Environmental Planning Instruments.

Regulatory Requirements	Considerations	Comment
***State Environmental Planning Policy (Infrastructure)* 2007**	The aim of the State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) is to facilitate the effective delivery of infrastructure across NSW by improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and by providing greater flexibility in the location of infrastructure and service facilities	The Site is considered suitable for the proposed development as it is located on land zoned IN1 General Industrial. Development of a waste or resource management facility is permitted in a prescribed zone which includes IN1. There are no environmental constraints that preclude the Modification Proposal.
***State Environmental Planning Policy (Western Sydney Employment Area)* 2009**	This *State Environmental Planning Policy (Western Sydney Employment Area)* 2009 the Western Sydney Employment Area for employment purposes. The particular aims include: a) to promote economic development and the creation of employment in the Western Sydney Employment Area by providing for development including major warehousing, distribution, freight transport, industrial, high technology and research facilities, b) to provide for the co-ordinated planning and development of land in the Western Sydney Employment Area, c) to rezone land for employment, environmental conservation or recreation purposes, d) to improve certainty and regulatory efficiency by providing a consistent planning regime for future development and infrastructure provision in the Western Sydney Employment Area, e) to ensure that development occurs in a logical, environmentally sensitive and cost-effective manner and only after a development control plan (including specific development controls) has been prepared for the land concerned, f) (f) to conserve and rehabilitate areas that have a high biodiversity or heritage or cultural value, in particular areas of remnant vegetation.	The *State Environmental Planning Policy (Western Sydney Employment Area)* 2009 (WSEA SEPP) provides land use zones for areas of Eastern Creek, Erskine Park and Horsley Park in accordance with schedule 1, development for the purposes of a waste facility for general solid waste (non-putrescible) is permissible with consent at the site.' Consistent with the WSEA SEPP, project approval was granted for a waste facility at the Site, and this Statement of Environmental Effects accompanies an application to modify the approved development to improve the ability of the facility to manage landfill gas. The Modification Proposal would support the ongoing provision of employment within the Western Sydney Employment Area.
State Environmental Planning Policy No 33 – Hazardous and Offensive Development	State Environmental Planning Policy No 33: Hazardous and Offensive Development (SEPP 33) outlines the requirements for a Preliminary Hazard Analysis screening test, required to be undertaken for hazardous and potentially hazardous industries.	The Modification Proposal is not considered "potentially hazardous" or "potentially offensive" as per the definitions in Part 1 of SEPP 33 and therefore the preparation of a preliminary hazard analysis (PHA) is not required in accordance with clause 12 of SEPP 33. Therefore, the modification proposal is

Regulatory Requirements	Considerations	Comment
		considered consistent with SEPP 33 (refer to Section 7.3).
State Environmental Planning Policy No 55 – Remediation of Land	Under State Environmental Planning Policy, No. 55: Remediation of Land (SEPP 55), applicants for consent must carry out a preliminary site investigation for any development consent sought on land previously used for activities that may cause contamination. SEPP 55 also imposes obligations to carry out any remediation work in accordance with relevant guidelines, developed under the Contaminated Lands Management Act 1995 (discussed further below) and to notify the relevant council of certain matters in relation to any remediation work.	The Modification Proposal will involve only works of the landfill surface. The proposed works do not present significant risks of exposure to soil, sediment, surface water and/or groundwater as all exhumed waste will remain in the landfill area and all exhumed waste and the landfill cap will be reinstated following installation of the gas collection system.
***State Environmental Planning Policy (Western Sydney Aerotropolis)* 2020**	The National Airports Safeguarding Framework has been implemented through the *State Environmental Planning Policy (Western Sydney Aerotropolis)* 2020 (Aerotropolis SEPP) which commenced on 1 October 2020 and sets out the land use and planning controls for the 11,200 hectare area surrounding the Airport, known as the ' Western Sydney Aerotropolis'. The SEPP aims to facilitate and promote the sustainable, orderly and transformational development of the Western Sydney Aerotropolis whilst ensuring development is compatible with the long-term growth and development of the Airport (including in relation to the operation of the Airport 24 hours a day).	The Modification Proposal has been assessed against the planning protection overlays referred to in Part 3 of the Aerotropolis SEPP. The proposed development will not impact on Airport safeguard including the Obstacle Limitation Service (OLS). The Site is located in the outer horizontal surface zone which has an OLS Elevation (AHD) of 230.5 m. The OLS Height relative to the ground level is 160 m.

5.3 *Blacktown Local Environmental Plan* 2015

The Site is located within the Western Sydney Employment Area therefore the Site is assessed under the conditions of the *State Environmental Planning Policy (Western Sydney Employment Area)* 2009, which takes precedence over the *Blacktown Local Environmental Plan* 2015.

5.4 *Blacktown Development Control Plan* 2015

As the project is located within the area zoned for the *State Environmental Planning Policy (Western Sydney Employment Area)* 2009, the planning controls within *Blacktown Development Control Plan* 2015 do not apply.

6. Consultation

Consultation for the permanent flare infrastructure has been carried out by DADEC in conjunction with other projects being undertaken on the Site, specifically the Recycling Optimisation Project and the Western Operational Area Project. Consultation undertaken to date has included:

- Community newsletter drop to surrounding residential properties, including Eastern Creek, Minchinbury, Erskine Park and St Clair;
- Three community webinar consultation sessions;
- One-on-one meetings with neighbouring landholders, key stakeholders and select community members; and
- Regular website and social media updates.

A total of 4,000 newsletters have been distributed over the period from 24 October 2021 to 28 October 2021. Following the first community webinar held on 4 November 2021, it was identified that a number of streets in Minchinbury did not receive the newsletter. An additional 1,000 newsletters were hand delivered to the streets identified by community members.

An additional webinar was then scheduled for Thursday 11 November 2021. This was included in the additional newsletters and was advertised on Bingo's website and Facebook page. The webinar was also:

- Advertised through Facebook advertising geolocated to Minchinbury, Erskine Park and Eastern Creek;
- Included on the home page of Bingo's website;
- Updated on Bingo's web page; and
- Promoted as events on Bingo's Facebook page.

The Modification Proposal was discussed at the following webinars / meetings:

- Community webinar 1 (4 November 2021);
- Community Webinar 2 (9 November 2021);
- Community Webinar 3 (11 November 2021);
- Meeting with DPIE Office of Strategic Lands (8 November 2021);
- Meeting with Goodman (10 November 2021);
- Meeting with Hanson (15 November 2021);
- Meeting with Sargents (12 November 2021);
- Meeting with EPA & DPIE (17 November 2021); and
- Meeting with Blacktown City Council (17 November 2021).

During the community webinar sessions, the majority of issues raised were in relation to the historic odour issues at the Site. Specific comments raised by the community on odour that are relevant to this Modification Proposal include:

- Why is a non-putrescible landfill creating odour?
- What is the permanent solution to ensure odours don't reoccur?
- Why are the flare systems built to European standards? Does Australia have standards of their own?
- What is the current volume of methane being extracted?
- The characterisation of the waste that isn't being diverted from landfill, including noting the primary source of biodegradable carbon?
- Why rainwater wasn't diverted from the waste during March to prevent the odour incident.

Specific comments raised by the community on odour that are relevant to this Proposal were addressed by Bingo (refer to Table 6.1). Concerns in relation to the environmental effects of the Modification Proposal have been

addressed in this Statement of Environmental Effects, particularly around odours issues which have been addressed in Section 7.1.

Table 6.1. Summary of community comments and where these matters have been addressed in the SEE.

Comment	Response	Document Section Reference
Why is a non-putrescible landfill creating odour?	The NSW Environment Protection Agency (EPA) advised BINGO that two potential sources of odour were identified in the landfill in early 2021- the leachate riser and vent pipe. The high levels of leachate impacting the leachate riser was the result of a one in a hundred-year rain event in March where significant volumes of water entered the landfill, increasing the potential for the production of odour. Measures have been implemented to divert surface water from entering the landfill as much as possible. Our landfill accepts inert, non-putrescible waste typically derived from construction and demolition and commercial and industrial sources and does not accept putrescible waste (such as waste in domestic red bins and food waste). However, inert landfills will include some organic material which can be broken down by micro-organisms in the absence of oxygen to produce methane. Some components of the waste accepted at the landfill contain a component called sulphate which are readily digestible by certain bacteria. Sulphates are a good source of food for these bacteria under certain conditions. These bacteria can produce an odorous gas, hydrogen sulphide, as a waste product, and this is what was smelt in the area earlier this year.	Section 7.1 and Appendix 5
What is the permanent solution to ensure odours don't reoccur?	The permanent solution involves the installation of two high temperature, fully enclosed ground flares to support the operations of the Eastern Creek REP (the subject of this Modification Proposal).	Section 3
Why are the flare systems built to European standards? Does Australia have standards of their own?	The flares have been designed to be achieve the requirements as set out by NSW Environment Protection Authority, through the 'Environmental Guidelines for Solid Waste Landfills' (2016), the *Protection of the Environment Operations Act* 1997, and the *Protection of the Environment (Clean Air) Regulation* 2021. The flares would also be constructed, installed and operated in accordance with relevant international and Australian Standards.	Section 3.1.1 and Appendix 5
What is the current volume of methane being extracted?	The air quality impact assessment included as Appendix 5 of this report estimates that the total landfill gas generation rate is around 4,286 standardised cubic metres per hour. Typically, landfill gas contains (by volume) 45 % to 60 % methane. Treatment by combustion of the captured landfill gas oxidises methane to carbon dioxide, thereby reducing the greenhouse gas impact of those emissions. The air quality impact assessment indicates that the Modification Proposal can be operated to result in compliance with all relevant air quality criteria.	Section 7.1 and Appendix 5
The characterisation of the waste that isn't being diverted from landfill, including	This residual waste stream is predominately comprised of light materials which include plastic, some timber, textiles, rubber, ceramics/dust/dirt and rock. As part of BINGO's innovation hub and commissioning of MPC2 at Eastern Creek we are undertaking a	Section 4

Comment	Response	Document Section Reference
noting the primary source of biodegradable carbon?	waste audit of these materials to understand the specifications of the material and exact composition of plastics / textiles etc to inform further investment in recycling technology to enhance the diversion rates over time.	

As part of the consultation process, Jackson Environment and Planning Pty Ltd consulted the NSW Environment Protection Authority and Blacktown City Council on key environmental issues which need to be considered in the Statement of Environmental Effects. The letter, dated 17 November 2021, that was sent to the NSW EPA, is contained in Appendix 3. The letter dated 22 November 2021, that was sent to Blacktown City Council is contained in Appendix 4.

The NSW EPA advised in an email on 19 November 2021 that no further specific environmental issues needed to be address and were satisfied to receive and review the final proposal, based on the Statement of Environmental Effects developed by Jackson Environment and Planning Pty Ltd.

No comment on the letter sent has been received from Blacktown City Council at this stage. However, additional consultation was carried out with Blacktown City Council on 17 and 29 November 2021 to provide a high-level briefing on the Proposal. Blacktown City Council may accept Bingo Industries Ltd offer for a more detailed briefing post-lodgement of the Development Modification application with DPIE.

A community engagement report is currently being prepared by WSP Elton which will include a summary of all consultation activities, including outcomes from two additional webinars planned for 11 and 13 December 2021. Any additional issues identified by community members will be addressed post lodgement through response to submissions process as agreed with DPIE and NSW EPA.

7. Environmental impact assessment

7.1 Air quality

Northstar Air Quality Pty Ltd (Northstar) was engaged to perform an air quality impact assessment (AQIA) and greenhouse gas assessment (GHGA) for the Modification Proposal. The assessment has considered the local air quality impacts and benefits of installing a permanent flare to provide an ongoing solution for the management of any gas produced within the landfill.

The AQIA / GHGA has been carried out in accordance with the relevant legislative guidelines and regulations applicable to air quality and greenhouse gas factor, including:

- *Protection of the Environment Operations Act* 1997.
- *Protection of the Environment Operations (Clean Air) Regulation* 2021.
- *Approved Methods for the Modelling and Assessment of Air Quality in NSW* (NSW EPA, 2017).
- *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (NSW DEC, 2006).
- *Environmental Guidelines, Solid Waste Landfills* (2nd edition) (NSW EPA, 2016).
- Bingo Industries, Landfill Gas Management Plan, Eastern Creek Recycling Ecology Park (& Landfill)
- Bingo Industries, Air Quality, Odour and Greenhouse Gas Management Plan
- Project Approval conditions (MP 06_0139) as modified.

The GHGA has been performed with due reference to the following policies, guidelines and plans:

- *National Greenhouse Account Factors August* 2021 (DISER, 2021).
- Bingo Industries, Landfill Gas Management Plan, Eastern Creek Recycling Ecology Park (& Landfill) (Bingo Industries, 2021a)
- Bingo Industries, Air Quality, Odour and Greenhouse Gas Management Plan (Bingo Industries, 2021b).
- Project Approval conditions (MP 06_0139) as modified.
- *National Greenhouse and Energy Reporting (Measurement) Determination* 2008.

This section provides a summary of the AQIA. The AQIA report is contained in Appendix 5.

7.1.1 Existing Environment

The Site is located in an area of lower residential population densities to the south and east (between 0 and 500 persons/km^2), with higher population densities (between 500 and 8 000 persons/km^2) to the west and north.

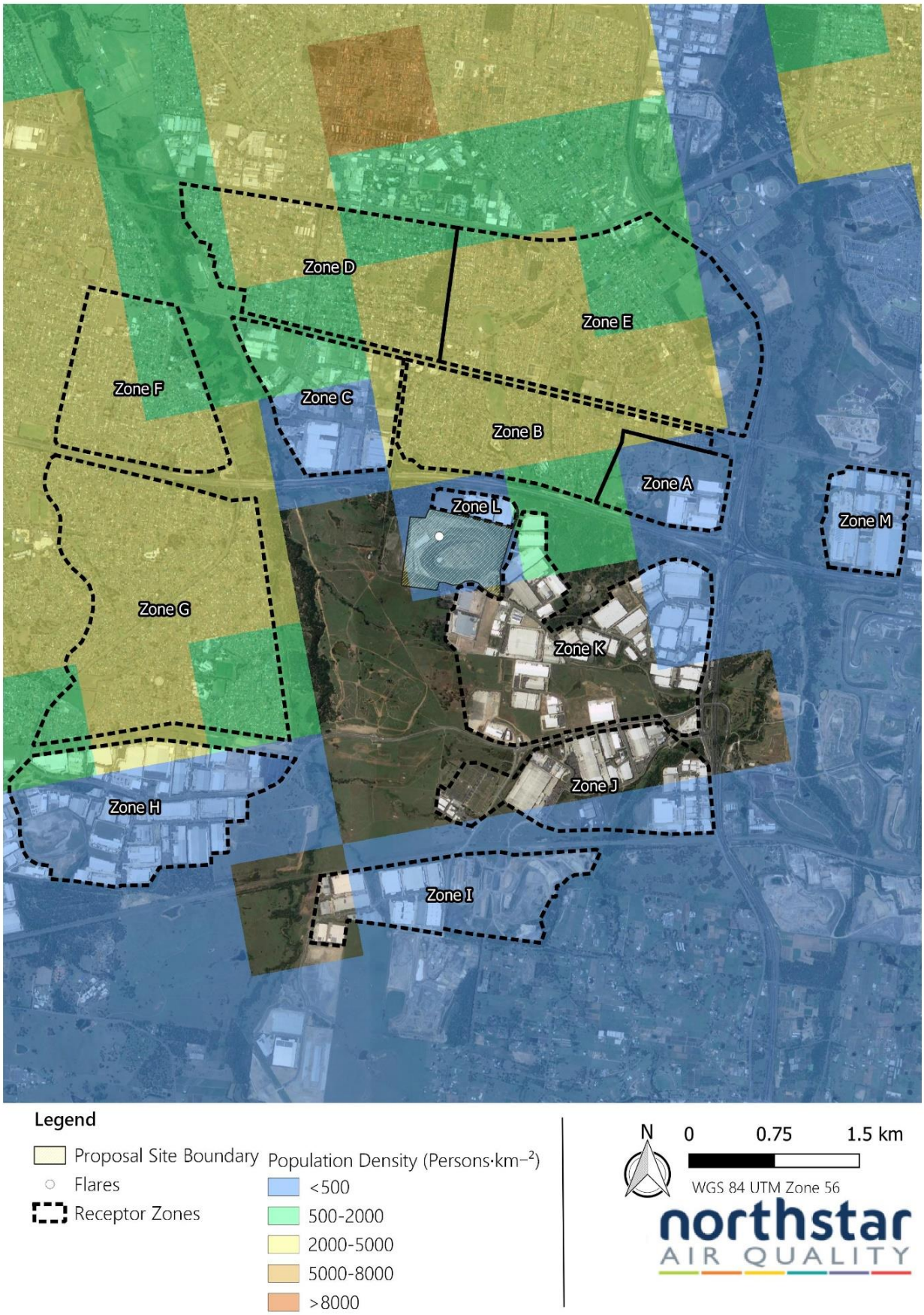
For the purposes of the AQIA, 13 'receptor zones' have been identified, as outlined in Table 7.1 and Figure 7.1.

Table 7.1. Sensitive receptor zones adopted in the study.

Zone	Suburb	Dominant land use	Distance to flares (m) [A]	Approximate area (km^2)	Centre of zone location (m, UTM 56)	
					Eastings	Northings
A	Minchinbury	Crematorium, Industrial	1,409	0.7	300 800	6 258 785
B	Minchinbury	Residential	587	1.7	299 491	6 259 263
C	Minchinbury	Industrial	755	1.3	297 811	6 259 593
D	Mount Druitt	Residential	1,537	2.4	297 857	6 260 740
E	Rooty Hill	Residential	1,491	3.8	300 295	6 260 216

Zone	Suburb	Dominant land use	Distance to flares (m) [A]	Approximate area (km²)	Centre of zone location (m, UTM 56)	
					Eastings	Northings
F	Colyton	Residential	1,949	1.7	296 155	6 259 699
G	Erskine Park / St Clair	Residential	1,553	4.0	296 349	6 257 755
H	Erskine Park	Industrial	2,335	2.3	296 059	6 256 016
I	Horsley Park	Industrial	2,805	1.4	298 817	6 255 196
J	Eastern Creek	Industrial	2,009	1.6	300 113	6 256 134
K	Eastern Creek	Industrial	479	3.0	299 999	6 257 344
L	Eastern Creek	Industrial	229	0.2	299 113	6 258 612
M	Eastern Creek	Industrial	3,366	0.6	302 541	6 258 425

Figure 7.1. Population density and sensitive receptors surrounding the Site.



7.1.2 Air quality criteria

Air quality guidelines adopted by the NSW EPA are published in the '*Approved Methods for the Modelling and Assessment of Air Quality in NSW*' (the Approved Methods (NSW EPA, 2016)) which has been consulted during the preparation of the AQIA. The criteria specified in the Approved Methods are the defining ambient air quality criteria for NSW. The criteria established to assess potential air quality impacts from the Modification Proposal are shown in Table 7.2.

Table 7.2. NSW EPA Air Quality Criteria.

Pollutant	Averaging period	Units	Criterion
Sulphur dioxide (SO_2)	10 minutes	µg/m³ (a)	712
	1 hour	µg/m³	570
	24 hours	µg/m³	228
	Annual	µg/m³	60
Nitrogen dioxide (NO_2)	1 hour	µg/m³	246
	Annual	µg/m³	62
Particulates (as PM_{10})	24 hours	µg/m³	50
	1 year	µg/m³	25
Particulates (as $PM_{2.5}$)	24 hours	µg/m³	25
	1 year	µg/m³	8
Particulates (as total suspended particulate [TSP])	1 year	µg/m³	90
Carbon monoxide (CO)	15 minutes	mg/m³ (d)	100
	1 hour	mg/m³	30
	8 hours	mg/m³	10

7.1.3 Impact Assessment

A quantitative assessment (dispersion modelling) has been performed, which seeks to assess the potential air quality impacts resulting from the operation of the permanent flares on the surrounding environment.

To appropriately assess the potential impacts in the area surrounding the Eastern Creek Recycling Ecology Park, the dispersion modelling has predicted air quality impacts at 4 900 individual locations, covering the residential areas of Minchinbury, Mt Druitt, Rooty Hill, Colyton, Erskine Park, and St Clair, and the industrial areas of Minchinbury, Erskine Park, Horsley Park and Eastern Creek.

The prevailing meteorology of the area has been assessed using observations made by the Australian Government Bureau of Meteorology, with a three-dimensional meteorological grid modelled to 'drive' the dispersion model.

In all cases, the emissions calculations represent potential worst-case impacts and are appropriate for comparison with short-term air quality criteria, and provided a more conservative approximation of emissions over the longer-term. It also noted that although the Modification Proposal is capable of treating up to 85 % of landfill gas for the purposes of this assessment a conservative gas capture rate of 70 % has been adopted.

The following sections provide a brief summary air quality assessment for the operation of the Modification Proposal. Air pollutant emissions during construction of the permanent flares and installation of the collection network are anticipated to be minimal and have not been subject to assessment.

7.1.3.1 Sulphur Dioxide

The predicted maximum 10 minute, 1-hour, 24-hour and annual average Sulphur Dioxide (SO_2) concentrations resulting from the Modification Proposal at all receptor locations below the criteria (refer to Table 7.3). The Modification Proposal will not result in any SO_2 impacts, helping to protect and maintain air quality within the area.

Table 7.3. Predicted sulphur dioxide concentrations.

Receptor zone	Maximum 10-minute SO_2 concentration ($\mu g/m^3$)			Maximum 1-hour SO_2 concentration ($\mu g/m^3$)			Maximum 24-hour SO_2 concentration ($\mu g/m^3$)			Annual average SO_2 concentration ($\mu g/m^3$)		
	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact
Criterion	712			570			228			60		
Max. % of criterion	38%	12%	50%	33%	11%	44%	16%	11%	28%	2%	23%	23%
A	82.2	86.2	168.4	57.6	60.3	117.9	23.8	26.2	50.0	0.9	1.8	2.7
B	108.8	86.2	195.0	76.1	60.3	136.4	25.9	26.2	52.1	1.1	2.8	3.9
C	63.0	86.2	149.2	44.0	60.3	104.3	5.4	26.2	31.6	0.3	3.8	4.1
D	99.8	86.2	186.0	69.8	60.3	130.1	7.4	26.2	33.6	0.6	4.8	5.4
E	165.2	86.2	251.4	115.5	60.3	175.8	11.9	26.2	38.1	0.8	5.8	6.6
F	89.4	86.2	175.6	62.6	60.3	122.9	4.9	26.2	31.1	0.2	6.8	7.0
G	115.5	86.2	201.7	80.7	60.3	141.0	7.5	26.2	33.7	0.3	7.8	8.1
H	36.8	86.2	123.0	25.7	60.3	86.0	4.5	26.2	30.7	0.2	8.8	9.0
I	82.0	86.2	168.2	57.1	60.3	117.4	4.6	26.2	30.8	0.2	9.8	10.0
J	90.0	86.2	176.2	62.8	60.3	123.1	7.7	26.2	33.9	0.3	10.8	11.1
K	270.3	86.2	356.5	188.1	60.3	248.4	26.8	26.2	53.0	0.8	11.8	12.6
L	178.3	86.2	264.5	124.7	60.3	185.0	36.6	26.2	62.8	1.2	12.8	14.0
M	31.4	86.2	117.6	22.0	60.3	82.3	6.5	26.2	32.7	0.2	13.8	14.0

7.1.3.2 Nitrogen Dioxide

The predicted maximum 1-hour and annual average Nitrogen Dioxide (NO_2) concentrations resulting from the Modification Proposal, at all receptor locations, are low and below the criteria (refer to Table 7.4). The Modification Proposal will not result in any NO_2 impacts, helping to protect and maintain air quality within the area.

Table 7.4. Predicted nitrogen dioxide concentrations.

Receptor zone	Maximum 1-hour NO_2 concentration (µg/m³)			Annual average NO_2 concentration (µg/m³)		
	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact
Criterion	246			62		
Max. % of criterion	10%	46%	56%	0.3%	30%	30%
A	7.5	112.8	120.3	0.1	18.4	18.5
B	9.9	112.8	122.7	0.1	18.4	18.5
C	5.7	112.8	118.5	<0.1	18.4	18.5
D	9.0	112.8	121.8	0.1	18.4	18.5
E	15.0	112.8	127.8	0.1	18.4	18.5
F	8.1	112.8	120.9	<0.1	18.4	18.5
G	10.4	112.8	123.2	<0.1	18.4	18.5
H	3.3	112.8	116.1	<0.1	18.4	18.5
I	7.4	112.8	120.2	<0.1	18.4	18.5
J	8.1	112.8	120.9	<0.1	18.4	18.5
K	24.4	112.8	137.2	0.1	18.4	18.5
L	16.2	112.8	129.0	0.2	18.4	18.6
M	2.9	112.8	115.7	<0.1	18.4	18.5

7.1.3.3 Particulate Matter – Annual Average PM_{10} and $PM_{2.5}$

The predicted annual average particulate matter concentrations (as TSP, PM_{10} and $PM_{2.5}$) are negligible at all receptor locations. The addition of existing background particulate matter concentrations results in the achievement of the cumulative annual average concentrations of TSP, PM_{10} and $PM_{2.5}$ at all receptor locations (refer to Table 7.5). The Modification Proposal will not result in any TSP, PM_{10} and $PM_{2.5}$ impacts, helping to protect and maintain air quality within the area.

Table 7.5. Predicted annual average TSP, PM_{10} and $PM_{2.5}$ concentrations.

Zone	Annual Average Concentration (µg/m³)								
	TSP			PM_{10}			$PM_{2.5}$		
	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact
Criterion	90			25			8		
Max. % of criterion	0.1%	43%	43%	0.2%	76%	76%	0.7%	96%	97%
A	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
B	0.1	38.9	39.0	0.1	18.9	19.0	0.1	7.7	7.8
C	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
D	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
E	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
F	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
G	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
H	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
I	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
J	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
K	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8
L	0.1	38.9	39.0	0.1	18.9	19.0	0.1	7.7	7.8
M	<0.1	38.9	40.0	<0.1	18.9	19.0	<0.1	7.7	7.8

7.1.3.4 Particulate Matter - Maximum 24-hour Average

The predicted maximum incremental 24-hour PM_{10} and $PM_{2.5}$ concentrations are low and easily achieve the criteria at all sensitive receptor locations (refer to Table 7.6). No background concentrations are included within Table 7.6.

Table 7.6. Predicted maximum incremental 24-hour PM_{10} and $PM_{2.5}$ concentrations.

Receptor	Maximum incremental 24-hour average concentration (µg/m³)	
	PM_{10}	$PM_{2.5}$
Criterion	50	25
Max. % of criterion	4%	7%
A	1.2	1.2
B	1.3	1.3
C	0.3	0.3
D	0.4	0.4

Receptor	Maximum incremental 24-hour average concentration (µg/m³)	
	PM_{10}	$PM_{2.5}$
Criterion	50	25
E	0.6	0.6
F	0.2	0.2
G	0.4	0.4
H	0.2	0.2
I	0.2	0.2
J	0.4	0.4
K	1.3	1.3
L	1.8	1.8
M	0.3	0.3

In 2017, the maximum 24-hour average PM_{10} background concentration measured at the Prospect Air Quality Monitoring Station (AQMS) was 61.1 µg/m^3, which exceeded the 50 µg/m^3 criterion. The highest non-exceeding background measured at the Prospect AQMS in 2017 was 40.2 µg/m^3 and therefore, the addition of the predicted PM_{10} concentrations would not result in any additional exceedances of that criterion. Note that this assumes that the highest increment and highest background concentration occur on the same day, which is a conservative assumption.

With respect to $PM_{2.5}$, the maximum 24-hour average background concentration was measured at the Prospect AQMS in 2017 to be 30.1 µg/m^3 (exceeding the criterion of 25 µg/m^3), and the maximum non-exceeding background concentration was 24.3 µg/m^3. Assuming a worst-case addition of the maximum non-exceeding background, and the maximum predicted increments from the Modification Proposal, there is a nominal additional exceedance of the relevant criterion in Receptor Zones A, B, K and L (where the increment is predicted to be > 0.7 µg/m^3).

A more refined approach has been adopted to assess the likelihood of additional exceedances occurring. Therefore, the predicted maximum 24-hour average $PM_{2.5}$ concentrations resulting from the operation of the Proposed Development Modification, with background included, at receptor zones A, B, K, and L, was modelled on days with the highest predicted incremental concentrations.

Following the more detailed assessment, none of the results indicate that any additional exceedances of the 24-hour $PM_{2.5}$ criterion are predicted to result from the operation of the Modification Proposal. The assessment found that the predicted exceedances are driven by the background air quality (i.e. existing sources) and is not contributed to by the Modification Proposal.

The study found that the Modification Proposal will make a negligible contribution to particulate matter levels, helping to protect air quality within the area.

7.1.3.5 Carbon Monoxide

The maximum 15 minute, 1-hour and 8-hour Carbon Monoxide concentrations are low and easily achieve the criteria at all sensitive receptor locations (refer to Table 7.7). The study found that the Modification Proposal will make a negligible contribution to carbon monoxide levels, helping to protect air quality within the area.

Table 7.7. Predicted carbon monoxide concentrations.

Receptor zone	Maximum 15-minute CO concentration (mg/m³)			Maximum 1-hour CO concentration (mg/m³)			Maximum 8-hour CO concentration (mg/m³)		
	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact
Criterion	100			30			10		
Max. % of criterion	<0.1%	2.4%	2.4%	<0.1%	6.0%	6.1%	<0.1%	13.0%	13.1%
A	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
B	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
C	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
D	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
E	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
F	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
G	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
H	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
I	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
J	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
K	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
L	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4
M	<0.1	2.4	2.5	<0.1	1.8	1.9	<0.1	1.3	1.4

7.1.3.6 Hydrogen Sulphide

The assessment shows a significant improvement in the aggregate impact of the odorous gas Hydrogen Sulphide (H_2S), with no exceedance of the H_2S impact assessment criterion predicted at any residential or industrial locations in the surrounding communities (refer to Table 7.8.).

Table 7.8. Predicted hydrogen sulphide concentrations.

Receptor zone	Dominant land use	99th percentile nose response time H_2S concentration (µg·m^{-3})		
		Incremental Impact		
Scenario		Flares at 967 ppm H_2S in LFG	Landfill surface	Flares + Landfill
Criterion	-	1.38		
Max. % of criterion	-	26%	51%	70%
A	Crematorium, Industrial	0.3	0.2	0.4
B	Residential	0.4	0.3	0.6
C	Industrial	0.1	0.2	0.3
D	Residential	0.2	0.1	0.2
E	Residential	0.2	0.1	0.3
F	Residential	0.1	0.0	0.1
G	Residential	0.1	0.1	0.2
H	Industrial	0.1	0.0	0.1
I	Industrial	0.1	0.0	0.1
J	Industrial	0.1	0.1	0.2
K	Industrial	0.3	0.7	1.0
L	Industrial	0.3	0.6	0.9
M	Industrial	0.1	0.0	0.1

7.1.3.7 Greenhouse gas emissions

The GHGA has evaluated the potential change in GHG emissions of the Modification Proposal against a base case scenario (assuming no capture or treatment of LFG by flaring), to establish the potential change in net GHG emissions. The GHGA indicates that the installation and operation of the two permanent methane gas combustion flares will result in a reduction of greenhouse gas emissions of approximately 265,085 t CO_2e each year, which corresponds to a reduction of approximately 67% when compared to base case emission estimates.

7.1.4 Mitigation Measures

The AQIA indicates that the Proposed Modification Development can be operated to result in compliance with all relevant air quality criteria. Emissions of odorous gases (characterised by H_2S emissions) are predicted to be well below the NSW EPA air quality criterion.

No additional mitigation measures are required, as landfill gas monitoring is performed in line with the Landfill Gas Management Plan (Bingo Industries, 2021a), specifically:

- Landfill gas management action LPG-09 (from table 5 of (Bingo Industries, 2021a)):
  - Undertake odour monitoring in accordance with requirements set out in the EC REP Air Quality, Odour and Greenhouse Gas Management Plan (Bingo Industries, 2021b).

  - Undertake odour monitoring (olfactometry) to provide feedback to the operation of the gas extraction system and other odour controls:
    - ambient air beyond site boundary at fixed monitoring locations.
    - on site at the boundary – fixed locations upwind and downwind of prevailing conditions on the day of monitoring.
    - on site within the landfill to evaluate odour reduction from gas extraction system operation.
- Landfill gas management action LPG-10 (from table 5 of (Bingo Industries, 2021a)):
  - Undertake LFG surface emissions monitoring;
    - within landfill area around the LFG wells and pipework to check for leaks.
    - within the landfill along transects to identify areas of high emissions of LFG (methane to aid additional well placement for odour reduction and need for placement of additional cover material.
    - at the waste/quarry wall interface to identify areas of high emissions of methane to aid additional future LFG well placement for odour reduction and need for placement of additional cover material.
    - landfill surface in system area & to target expansion of system (it is recommended that for targeted and operational investigation, transect spacings are reduced).
- LPG-16 (from table 5 of (Bingo Industries, 2021a)):
  - Update Air Quality, Odour & Greenhouse Gas Management Plan to refer to this LFGMP in relation to management of LFG emissions.

7.1.5 Conclusion

The air quality impact assessment conducted by Northstar has been performed to evaluate the potential risk of off-site impacts of air pollutants such as carbon monoxide, nitrous oxides, sulfur dioxide, particulate matter and hydrogen sulphide from the operation of the flare.

The findings of the air quality impact assessment indicate that the levels of all air pollutants assessed are below the NSW EPA air quality criteria as published in the '*Approved Methods for the Modelling and Assessment of Air Quality in NSW*' (the Approved Methods (NSW EPA, 2016)), at all residential and industrial locations surrounding the Eastern Creek Recycling Ecology Park. In the case of fine particulate matter, exceedances of the air quality criteria are observed in the air quality record, even without the operation of the flares, and that the operation of those flares would not result in any additional exceedances of the relevant particulate criteria.

Emissions of odorous gases (characterised by H_2S emissions) are predicted to be well below the NSW EPA air quality criterion for all residential or industrial locations in the surrounding communities.

In comparison to uncontrolled emissions of LFG through the surface of the landfill, the Modification Proposal is shown to provide effective capture, treatment and dispersion of any by-products into the atmosphere. In relation to greenhouse gas emissions, the capture and treatment of methane results in emissions of CO_2e being 67% lower when compared to the uncontrolled and untreated release into the atmosphere.

The Modification Proposal will help to make a substantial contribution to improving air quality in the area compared to a scenario where landfill gas is not collected and treated.

7.2 Noise and vibration

RWDI Australia Pty Ltd (RWDI) was engaged to conduct a noise impact assessment to support the Modification Proposal to evaluate the impact on the permanent flares on local noise levels in the area. This is important as the permanent flares will be operating on a 24/7 basis.

The assessment will be based on the following NSW noise policies and guidelines:

- *NSW Noise Policy for Industry* (NPfI) (Environment Protection Authority [EPA], 2017);
- *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009).

This section provides a summary of the noise impact assessment. The full noise impact assessment report is contained in Appendix 6.

7.2.1 Existing Environment

The noise limits for the site, as documented in the Environmental Protection Licence 13426 are presented in Table 7.3.

Table 7.3. Existing approved noise limits

Location	Noise Limits dBA						
	Day	Evening	Night			Morning Shoulder	
	$L_{Aeq,}$ (15minutes)	$L_{Aeq,}$ (15minutes)	$L_{Aeq,}$ (15minutes)	$L_{Aeq,}$ (period)	$L_{A1,}$ (1minutes)	$L_{Aeq,}$ (15minutes)	$L_{A1,}$ (1minutes)
1-6 Eber Place, Minchinbury	48	47	44	41	53	47	53
2-44 Warbler Street, Erskine Park	42	42	39	N/A	44	39	44

7.2.2 Impact assessment

7.2.2.1 Operation

The main noise source produced from operation of the Modification Proposal is the blower. The blower is to be installed with silencers on both inlet and outlet and with a noise reduction enclosure. The sound power level of the blower enclosure was provided as being 89dBA. The noise level from the flare burning was taken from site noise measurements conducted by RWDI from the existing temporary flare facility. The sound power level of the flare burning is assumed to be 97dBA. The flare operates continuously and therefore there are no expected maximum noise level events expected from the plant. As such maximum noise levels have not been considered any further in the noise assessment.

It was assumed that the flares would operate on a 24-hour basis. Therefore, operational noise levels associated with the Modification were predicted for the day (7.00am-6.00pm), evening (6.00pm-10.00pm), night (10.00pm-5.00am) and morning shoulder (5.00am-7.00am) assessment periods.

The predicted operational noise levels for the Site with the flare operating shows compliance with the operational approval noise limits (refer to Table 7.4). Predicted noise levels associated with both standard meteorological conditions (“calm”) and noise enhancing (“NE”) meteorological conditions are presented in Table 7.4.

The noise contribution from the Modification Proposal to the overall noise at the Site is so low that it does not contribute to the overall noise level.

Table 7.4. Predicted site noise emissions for the Eastern Creek REP including the flares.

Assessment location	Period	Existing Site noise	Flares operating	Total noise from the site	Existing Site noise	Flares operating	Total noise from the site	Approval Noise Limit	Complies
		Calm			NE				(Yes/No)
1	Day	44	<15	44	44	<15	44	48 $L_{Aeq,15\ minute}$	Yes
	Evening	41	<15	41	41	<15	41	47 $L_{Aeq,15\ minute}$	Yes
	Night	36	<15	36	36	<15	36	44 $L_{Aeq,15\ minute}$	Yes
	Morning Shoulder	44	<15	44	44	<15	44	47 $L_{Aeq,15\ minute}$	Yes
2	Day	41	<15	41	41	<15	41	42 $L_{Aeq,15\ minute}$	Yes
	Evening	42	<15	42	42	<15	42	42 $L_{Aeq,15\ minute}$	Yes
	Night	34	<15	34	34	<15	34	39 $L_{Aeq,15\ minute}$	Yes
	Morning Shoulder	39	<15	39	39	<15	39	39 $L_{Aeq,15\ minute}$	Yes

7.2.2.1 Construction

Key elements of the construction of the Proposal will include:

- Earthworks and civil works to establish the hardstand for the permanent flare location;
- Erection of the permanent flare structure (incorporating flare stack, blowers and acoustic enclosure);
- Connection pipework and headworks; and
- Installation of gas collection wells and associated collection infrastructure within the landfill.

Various types of plant and equipment would be required for the various construction activities of the Modification Proposal. A summary of the plant and equipment that are likely to be used during the construction of the Modification Proposal are summarised in Table 7.5. Table 7.5 is split up into three noise modelling scenarios that are likely to be used during the construction of the Modification Proposal. Table 7.5 presents the sound power levels for individual items of construction equipment and overall activity sound power levels.

Table 7.5. Indicative Construction Activities and Equipment for the Modification Proposal with their Sound Power Level.

Activity	Equipment	Qty	Individual SWL (dBA)	Activity SWL (dBA)
Scenario 1				
Earthworks and establishment of levelled hardstand	Excavator	1	113	**119**
	Grader	1	113	
	Dump truck	1	112	
	Compactor	1	110	
	Dozer	1	106	
	Hand tools	As required	105	
Scenario 2				
Erection of the permanent flare structure (incorporating flare stack, blowers and acoustic enclosure);	Hand tools	As required	105	**111**
	Mobile Crane	1	105	
	Road truck	1	108	
Scenario 3				
Connection pipework and headworks, Installation of gas collection wells and associated collection infrastructure within the landfill	Mobile Crane	1	105	**111**
	Road truck	1	108	
	Hand tools	As required	105	

The predicted construction noise levels associated with the construction of the flares shows compliance with the operational approval noise limits (refer to Table 7.6 and Table 7.7). Predicted noise levels associated with both standard meteorological conditions (“calm”) and noise enhancing (“NE”) meteorological conditions are presented in Table 7.6 and Table 7.7 respectively.

Table 7.6: Predicted site noise emissions for the Eastern Creek REP including the flare construction activities (Calm meteorological conditions).

Assessment location	Scenario 1			Scenario 2			Scenario 3			Approval Noise Limit	Complies (Yes/No)
	Existing Noise level $L_{Aeq,15min}$	Construction Contribution $L_{Aeq,15min}$	Total $L_{Aeq,15min}$	Existing Noise level $L_{Aeq,15min}$	Construction Contribution $L_{Aeq,15min}$	Total $L_{Aeq,15min}$	Existing Noise level $L_{Aeq,15min}$	Construction Contribution $L_{Aeq,15min}$	Total $L_{Aeq,15min}$		
1	44	22	44	44	<15	44	44	<15	44	48 LAeq,15 minute	Yes
2	41	<15	41	41	<15	41	41	<15	41	42 LAeq,15 minute	Yes

Table 7.7. Predicted site noise emissions for the Eastern Creek REP including the flare construction activities (Noise Enhancing conditions).

Assessment location	Scenario 1			Scenario 2			Scenario 3			Approval Noise Limit	Complies (Yes/No)
	Existing Noise level $L_{Aeq,15min}$	Construction Contribution $L_{Aeq,15min}$	Total $L_{Aeq,15min}$	Existing Noise level $L_{Aeq,15min}$	Construction Contribution $L_{Aeq,15min}$	Total $L_{Aeq,15min}$	Existing Noise level $L_{Aeq,15min}$	Construction Contribution $L_{Aeq,15min}$	Total $L_{Aeq,15min}$		
1	44	27	44	44	19	44	44	<15	44	48 LAeq,15 minute	Yes
2	41	<15	41	41	<15	41	41	<15	41	42 LAeq,15 minute	Yes

7.2.3 Mitigation Measures

There are no exceedances of the established criteria, and no further mitigation or controls are required. However, noise during operation of the Modification Proposal should be checked biannually by carrying out compliance monitoring at locations in Minchinbury and Erskine Park as per EPL 13426.

7.2.4 Conclusion

Noise impacts associated with the construction and operation of the Modification Proposal have been assessed in accordance with the relevant NSW Government guidelines and policies.

The predicted operational noise levels for the Site with the flare operating shows compliance with the operational approval noise limits for the day (7.00am-6.00pm), evening (6.00pm-10.00pm), night (10.00pm-5.00am) and morning shoulder (5.00am-7.00am) assessment periods. The flare noise contribution is so low that it does not contribute to the overall noise level.

The predicted construction noise levels associated with the construction of the flares and the existing Eastern Creek REP are compliant with the operational approval noise limits.

The installation of permanent flares and their operation on a 24/7 basis will contribute to negligible noise in the local area and will not interfere with the amenity of people living and working in the local area.

7.3 Hazard and risk

A qualitative environmental risk assessment has been performed to identify key potential impacts of the development.

The assessment has been performed according to AS/NZS ISO 31000: 2009 *Risk Management – Principles and Guidelines* and the Preliminary Hazardous Analysis has been informed by the *Hazardous and Offensive Development Application Guidelines - Applying SEPP 33* (NSW Department of Planning, 2011)[2]. The following guidelines published by the NSW Department of Planning in 2011 have also been considered:

- Hazardous Industry Planning Advisory Paper No 2 - Fire Safety Study Guidelines[3];
- Hazardous Industry Planning Advisory Paper No 3 - Risk Assessment[4];
- Hazardous Industry Planning Advisory Paper No 4 - Risk Criteria for Land Use Safety Planning[5]; and
- Hazardous Industry Planning Advisory Paper No 6 - Hazard Analysis[6].

The assessment considers off-site risks to people, property and the environment (in the presence of controls) arising from atypical and abnormal hazardous events and conditions (i.e. equipment failure, operator error and external events). The hazard treatment measures that have been proposed assist in producing a 'low' level of risk in accordance with the risk acceptance criteria.

A preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* has also been undertaken to identify if the Modification Proposal is "potentially hazardous" and whether a Preliminary Hazard Analysis (PHA) is required.

7.3.1 Methodology

7.3.1.1 Environmental risk assessment

The assessment for the environmental risk assessment included the following steps:

- Identify and screen the hazards associated with the project;
- Examine the maximum reasonable consequence of identified events;
- Qualitatively estimate the likelihood of events;
- Proposed risk treatment measures;
- Qualitatively assess risks to the environment, member of the public and their property arising from atypical and abnormal events and compare these to applicable qualitative criteria;
- Recommend further risk treatment measures if considered warranted; and

[2] NSW Department of Planning (2011). Hazardous and Offensive Development Application Guidelines - Applying SEPP 33. Published by the NSW Department of Planning. Internet publication: http://www.planning.nsw.gov.au/en/Policy-and-Legislation/~/media/3609822D91344221BA542D764921CFC6.ashx

[3] NSW Department of Planning (2011). Hazardous Industry Planning Advisory Paper No 2 - Fire Safety Study Guidelines. Published by the NSW Department of Planning. Internet publication: http://www.planning.nsw.gov.au/Policy-and-Legislation/~/media/CCC734E980C4427DB95D319DF073C41A.ashx

[4] NSW Department of Planning (2011). Hazardous and Offensive Development Application Guidelines- Risk Criteria for Land Use Safety Planning. Published by NSW Department of Planning. Internet publication: http://www.planning.nsw.gov.au/Policy-and-Legislation/~/media/0D39F08E7889409BBA1FA88D5FB859FD.ashx

[5] NSW Department of Planning (2011). Hazardous Industry Planning Advisory Paper No 4 - Risk Criteria for Land Use Safety Planning. Published by the NSW Department of Planning. Internet publication: http://www.planning.nsw.gov.au/Policy-and-Legislation/~/media/0D39F08E7889409BBA1FA88D5FB859FD.ashx

[6] NSW Department of Planning (2011). Hazardous Industry Planning Advisory Paper No 6 - Hazard Analysis. Published by NSW Department of Planning. Internet publication: http://www.planning.nsw.gov.au/Policy-and-Legislation/~/media/3ACC37BE3EFE4BAAB3EBA5872AFBA8BD.ashx

- Qualitatively determine the residual risk assuming the implementation of the risk treatment measures.

To undertake a qualitative risk assessment, it is useful to describe the levels of consequence of a particular event, and the likelihood or probability of such an event occurring. Risk assessment criteria have been developed in AS/NZS ISO 31000: 2009 and are shown in Table 7.8 and Table 7.9. Combining the probability and consequence tables, Table 7.10 provides a qualitative risk analysis matrix to assess risk levels.

Table 7.8. Qualitative measures of probability.

Event	Likelihood	Description
A	Almost certain	Happens often
B	Likely	Could easily happen
C	Possible	Could happen and has occurred elsewhere
D	Unlikely	Has not happened yet but could
E	Rare	Conceivable, but only in extreme circumstances

Table 7.9. Qualitative measures of maximum reasonable consequence.

Event	People	Environment	Asset / Production
1	Multiple fatalities	Extreme environmental harm (e.g. widespread catastrophic impact on environmental values of an area)	More than $1B loss or production delay
2	Permanent total disabilities, single fatality	Major environmental harm (e.g. widespread substantial impact on environmental values of an area)	$100M to $1B or production delay
3	Minor injury or health effects (e.g. major lost workday case / permanent disability)	Serious environmental harm (e.g. widespread and considerable impact on environmental values of an area)	$5M - $100M loss or production delay
4	Minor injury or health effects (e.g. restricted work or minor lost workday case)	Material environmental harm (e.g. localised and considerable impact on environmental values of an area)	$250K to $5M loss or production delay
5	Slight injury or health effects (e.g. first aid / minor medical treatment needed)	Minimum environmental harm (e.g. minor impact on environmental values of an area)	Less than $250K or production delay

Table 7.10. Qualitative risk analysis matrix used in the environmental risk assessment.

		Probability[1]				
		A	B	C	D	E
Consequence	1	1 (H)	2 (H)	4 (H)	7 (M)	11 (M)
	2	3 (H)	5 (H)	8 (M)	12 (M)	16 (L)
	3	6 (H)	9 (M)	13 (M)	17 (L)	20 (L)
	4	10 (M)	14 (M)	18 (L)	21 (L)	23 (L)
	5	15 (M)	19 (L)	22 (L)	24 (L)	25 (L)

[1] Legend – L: low; M: Moderate; H: high; Risk numbering: 1 – highest; 25 – lowest risk. Colour coding: Green: tolerable risk; orange: ALARP – as low as reasonably practicable; red: intolerable risk.

7.3.1.2 Preliminary risk screening

An assessment of the Modification Proposal against screening criteria has been undertaken in accordance with the risk screening procedure outlined in NSW Department of Planning (2011) in the *Hazardous and Offensive Development Application Guidelines - Applying SEPP 33*.

7.3.2 Impact assessment

7.3.2.1 Environmental risk assessment

To help understand further hazards possible as part of the proposed development, a series of potential worst-case scenarios have been assessed to determine possible consequences, likelihood and risk. The NSW Department of Planning's (2011) *Hazardous Industry Planning Advisory Paper No 6 - Hazard Analysis* has been used to assist in guiding this analysis.

As per the above guidelines, this assessment has qualitatively assessed the impacts of the largest possible event on people, plant and the environment. The worst-case scenarios reflect any foreseeable factors that could exacerbate the severity of an accident, including abnormal process conditions, out of hours manning levels, and the potential for control measures to be disabled or rendered inoperable by the accident.

The worst-case scenarios we have assessed include the following:

- Exposure to chemicals such as heavy metals, TPH, BTEX, PCBs etc.;
- Landfill gas: fire or explosion during construction;
- Landfill gas: fire, explosion or exposure to landfill gas post construction;
- Interaction of construction vehicles with other vehicles on the Site (stockpiling and any other works concurrently carried out at the Site);
- Collapse of excavations and/or vehicles sliding into excavation;
- Striking services such as other gas collection system infrastructure;
- Pipe welding: burns, landfill gas fire;
- Security of flare from community during operations;
- Importing materials;
- Road accidents;
- Falls or accidents as a result of working on uneven surfaces;
- Slips, trips or falls during operation and maintenance;
- Vehicle accidents as part of maintenance works;
- Exposure of public to landfill gas lateral migration of landfill gas and accumulation in subsurface service trenches, pits or buildings;
- Condensate accumulation and pipe blockage;
- Striking of gas collection system pipework in post-construction excavations; and
- Flare shutdown leading to uncontrolled methane emissions.

Prevention and treatment measures to reduce the likelihood and resulting consequences from these worst-case scenarios are mapped out in Table 7.11 below. Note that a risk rating category has been prepared to understand the significance of these risks – on the environment and human health. Note that the risk ratings estimated as part of the qualitative analysis are specified after implementation of the risk prevention, treatment and detection measures.

Table 7.11. Hazard identification, scenario, consequence, prevention/treatment measures and risk rating table.

Risk / Factor	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Required	Likelihood	Consequence	Risk rating and category (after treatment measures)[1]
Exposure to chemicals	Exposure to chemicals such as heavy metals, TPH, BTEX, PCBs etc. during construction, in particular during excavation of waste or drilling of wells	• Wear appropriate PPE. • Cover excavated material	Unlikely (D)	3	17 (Low risk)
Fire or explosion	Landfill gas for fire or explosion during construction.	• Prepare and implement appropriate monitoring and management procedures during construction • Hot working permits to be implemented as required. • Prohibit smoking on the Site. •	Unlikely (D)	2	12 (Moderate risk)
	Explosion or exposure to landfill gas post construction	• Routine surface and subsurface gas monitoring. • Appropriate warning labels on all structures, such as head walls, pipe outlets and leachate collection wells. • Hot working permits to be implemented as required. • Explosive limit monitoring. • A marker layer will be placed above buried pipes. •	Unlikely (D)	2	12 (Moderate risk)
	Pipe welding: burns, landfill gas fire	• Wear appropriate PPE • Prepare and implement appropriate monitoring and management procedures during construction.	Possible (C)	3	13 (Moderate risk)

Risk / Factor	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Required	Likelihood	Consequence	Risk rating and category (after treatment measures)[1]
Traffic	Interaction of construction vehicles with other vehicles on site (stockpiling and any other works concurrently carried out at the Site)	• Implement standard construction traffic management measures as part of the CEMP	Unlikely (D)	3	17 (Low risk)
	Importing materials causes road accident		Unlikely (D)	3	17 (Low risk)
	Vehicle accidents as part of maintenance works		Unlikely (D)	3	17 (Low risk)
Excavations	Collapse of excavations and/or vehicles sliding into excavation.	• Excavation in waste always to be battered at no steeper than 2H:1V (50% slope). • Backfill excavations as soon as possible. Use fencing where excavations have to remain open.	Unlikely (D)	3	17 (Low risk)
Services	Striking services such as other gas collection system infrastructure	• Contractor to do service search. • Contractor to decommission services prior to construction.	Possible (C)	3	13 (Moderate risk)
	Striking of gas collection system pipework in post-construction excavations	• Pipework below marker layer in capping system. • Header pipes covered with a gravel layer. •	Unlikely (D)	3	17 (Low risk)
Security	Security of flare from public during operations	• Flare to be fenced off.	Rare (E)	3	20 (Low risk)
Slips, trips and falls	Falls or accidents as a result of working on uneven surfaces	• Contractor to be made aware and to develop appropriate work methodologies • Bingo to provide safe access to all locations requiring monitoring or maintenance by staff.	Unlikely (D)	3	17 (Low risk)
Exposure to landfill gas	Exposure of public to landfill gas	• Prevent access to landfill gas wells, valves and condensate pumps by fencing or enclosure.	Rare (E)	4	23 (Low risk)

Risk / Factor	Possible scenarios, results & consequences	Prevention, Treatment Measures and Detection Protection Required	Likelihood	Consequence	Risk rating and category (after treatment measures)[1]
		• Prevent access of public to gas flare by fencing and co-locating flare within leachate plant compound. • Securely lock landfill gas monitoring points.			
	Lateral migration of landfill gas and accumulation in subsurface service trenches, pits or buildings	• Regular monitoring of perimeter landfill gas monitoring wells to detect lateral subsurface gas migration from the landfill.	Rare (E)	4	23 (Low risk)
Condensate	Condensate accumulation and pipe blockage	• The system is designed so that defective sections of the gas collection system may be isolated. Additional pumping at condensate sumps can be used to clear the system.	Rare (E)	5	25 (Low risk)
Flare	Flare shutdown leading to uncontrolled methane emissions	• Slam shut and failsafe valves fitted throughout. • Flare is remotely monitored using telemetry and checked by a qualified Technician at least once every two weeks. • Gas system pipework is air tight and rigorously pressure tested at commissioning stage. Therefore will not leak methane when shutdown.	Rare (E)	5	25 (Low risk)

7.3.2.2 Preliminary risk screening

The Modification Proposal will not involve the storage of hazardous materials within the Site or the transportation of hazardous materials to/from the Site. In addition, Appendix 3 of the SEPP 33 Guidelines provides a schedule of potentially hazardous industries that may fall within SEPP 33. The Modification Proposal is not included in this schedule and is not considered a potentially hazardous or offensive development. Therefore, a Preliminary Hazard Assessment is not required.

7.3.3 Fire and incident management

The potential for a fire during the construction and operation of the flares is considered moderate however the following infrastructure is in place to managed it.

The flares (Run Energy model OEF-300) are design in accordance with the relevant Australian and international standards, including:

- Australian Standard AS1375 *Industrial Fuel-Fired Appliances;*
- Australian Standard AS 5601 *Gas Installations*;
- Australian Standard AS 3814 *Industrial and Commercial Gas Fired Appliances;*
- *Dangerous Substances and Explosive Atmospheres Regulations* 2002;
- Implementing the Chemical Agents Directive 98/24/EC (CAD); and
- The Explosive Atmospheres Directive 99/92/EC (ATEX 137).

Australian Standard AS 3814 *Industrial and Commercial Gas Fired Appliances* specifies the uniform minimum requirements for the design, construction and safe operation of Type B appliances that are intended for use with town gas, natural gas, simulated natural gas, liquefied petroleum gas and tempered liquefied petroleum gas or any combination of these gases either together or with other fuels. These include:

- Requirement for test points;
- Systems for methane level detection;
- Flash back protection;
- Overtemperature protection; and
- Fully reliable flame monitoring system to enable 24-hour operation and 24-hour monitoring.

The Run Energy model OEF-300 flares are also fitted with the following standard safety features:

- Safety programable logic controller with safety interlocks for start-up;
- Double block and bleed valves with auto shut off (refer to Figure 3.4);
- Flame detect / UV sensors; and
- Dual control systems (independent controls on each flare).

The double block slam shut valves remains open. In the event that pressure exceeds the permissible limit, the slam shut-off valves immediately shut off the flow to the flare.

All landfill gas equipment and infrastructure will be installed by suitably qualified landfill gas technicians / engineers operating under the company's own procedures and Safe Work Method Statements which cover fire risks and incidents. These procedures will also apply to the decommissioning and removal of the temporary flares from the site.

Should an emergency arise, the procedures outlined in the Site's Emergency Response Plan; Landfill Management Plan and Pollution Incident Response Management Plan will be engaged.

It is important to note that the temporary landfill gas network was installed and has been operating for over six 6 months with no fires or incidents.

Therefore, other than those listed above, no additional environmental protection equipment is required to be installed on the premises for the mitigation of fire and incident risks.

7.3.4 Mitigation Measures

Management of hazards and risks associated with construction and operation of the Modification Proposal would be undertaken in accordance with the Sites existing approved Emergency Fire and Pollution Incident Response Management Plan. Relevant parts of this plan should be reviewed to ensure that all mitigation measures are included to a satisfactory manner.

7.3.5 Conclusion

The Project is not deemed hazardous or potentially hazardous under SEPP 33 and therefore it is not considered applicable and no further Preliminary Hazard Analysis or Multi-Level Risk Assessment has been performed.

The risk assessment above identifies that worst-case scenarios modelled with risk prevention, treatment and detection measures are all moderate or low risks and can be appropriately managed.

No matters have been identified for further assessment. Implementation of the prevention and treatment measures during the construction and operation of the permanent flare will ensure that the Modification Proposal will have minimal potential impact on people and the environment.

7.4 Soil and water

7.4.1 Existing environment

Historical quarrying activities and earthworks have altered site topography which have altered the hydrogeology and surface drainage patterns.

The hydrogeology at the Site is described by Ian Grey Groundwater Consulting Pty Ltd's report (2009[7]) in some detail. The hydrogeological setting comprises a layered aquifer system including a perched aquifer in the upper weathered profile and a series of aquifers in the more transmissive horizons of the underlying bedrock. Other observations include:

- The upper weathered profile shows low to moderate hydraulic conductivity. Groundwater levels are around 67m AHD and the hydraulic connection between the shallow aquifer and the quarry appears limited;
- The intermediate Wianamatta Group aquifer layers (i.e. the upper to middle zones in the bedrock, c.30 m to 100 m depth) show generally negligible or very low hydraulic conductivities with occasional zones of higher values of up to 0.04 m/d. Stabilised groundwater levels are around 55 mAHD; natural levels would be expected to be slightly below those of the shallow groundwater zone and this shows the effect of depressurisation caused by pumping of groundwater from the quarry;
- The deep Wianamatta Group aquifer layers (c.100 m to 150m depth) show generally negligible or very low hydraulic conductivity values with occasional zones of higher values of up to 0.01 m/d. Stabilised groundwater levels are around 31 m AHD showing the effect of depressurisation.

Although groundwater levels ranging from between approximately 31m AHD to 67m AHD and the depth of waste in the landfill ranging from approximately -60m AHD to 35-40m AHD (at December 2020), groundwater inflows giving rise to leachate generation from groundwater ingress into the waste are reportedly small due to the low hydraulic conductivity of the lower Wianamatta group aquifer layers.

IGGC (2009) estimated:

- The existing groundwater inflows are 26 m^3/day (observed) and 67 m^3/day (modelled);
- Rainfall recharge of 657 m^3/day (modelled); and
- The long-term groundwater inflow rate5 is therefore estimated to be below 3 m^3/day.

These estimates are averages and do not reflect seasonal variability but indicate percolation of precipitation after evaporation loss is the most significant contribution to the leachate level (and storage), however its impact is subject also to other material factors including:

- Increases due to:
    - Consolidation Settlement; and
    - Dust Suppression.
- Losses and Storage due to:
    - Evaporation (dependent on landfill cover);
    - Surface runoff capture and removal (as leachate or stormwater);
    - Waste Absorptivity (rate of filling); and
    - Leachate removal (to LTP and sewer as Trade Waste).

Drainage paths within the Site have no base flow and nil to very little native riparian vegetation. General overland flow direction across the Site is to the north-west and ultimately reaches Ropes Creek approximately 1km west of the Site.

[7]Ian Grey Groundwater Consulting Pty Ltd (2009), *Proposed Light Horse Landfill Site, Eastern Creek: Detailed Hydrogeological Investigation and Assessment.*

Ropes Creek flows northwards and is located along the western boundary of the Precinct with a total catchment area of approximately 127Ha. There is an ephemeral drainage line in the northern portion of the Site that flows west towards Ropes Creek. To the south of the quarry and beyond the extents of the proposed site operations, overland drainage is generally south to south-west towards a tributary of Ropes Creek.

The Site surface water drainage network is characterised by wide, flat and generally poorly defined drainage lines, which is fairly typical of drainage in western Sydney, where low topographic relief and meandering drainage lines dominate the natural landscape.

Surface stormwater runoff generated on-site is categorised as either 'clean' or 'dirty'. Clean stormwater runoff will be generated from:

- building roofs (workshop, Material Processing Centre, administration building, and weighbridge shed);
- roads, car parks and other hardstand areas;
- materials stockpile area/ working floor/ drop off zone; and
- pit walls, haul road and capped areas within the landfill.

Clean stormwater runoff is captured in water storages on site. Stormwater is also harvested from the roofs of structures, such as the MPC, which stores rainwater in the emergency dam underlying the MPC shed.

The Site currently uses water cannons, water carts and water sprinklers to minimise dust generation in the landfill pit, the SMA and MPC. Water for dust control is supplied from stormwater that has been harvested from the Site area.

7.4.2 Impact assessment

No changes or impacts to are expected on the leachate generation at the Site from the Modification Proposal. Minor excavations works are required to install the header lines.

The Modification Proposal would not result in significant changes to stormwater runoff quantity or quality. The Modification Proposal would result in a slight increase to impervious surfaces due to the inclusion of the LFG Flare concrete hardstand (646m^2). However, given the relatively minor increase in impervious surface there would be no significant change to stormwater behaviour as a result. The Modification Proposal would utilise existing on-site stormwater management infrastructure.

7.4.3 Mitigation Measures

Surface water at the facility will continue to be managed in accordance with the Site's approved Soil, Water and Leachate Management Plan.

7.4.4 Conclusion

The Modification Proposal would not result in significant changes to stormwater runoff quantity or quality. The Modification Proposal would result in a slight increase to impervious surfaces due to the inclusion of the LFG Flare concrete hardstand (646m^2). However, given the relatively minor increase in impervious surface, there would be no significant change to stormwater behaviour as a result. Surface water at the facility will continue to be managed in accordance with the Site's existing Soil, Water and Leachate Management Plan.

7.5 Biodiversity

7.5.1 Existing Environment

The Site is considered unsuitable habitat for fauna due to the degree of disturbance from the landfill operation, and the lack of suitable vegetation necessary for foraging and protection.

An EPBC Protected Matters Search was also undertaken on 14 October 2021 to determine whether Matters of National Environmental Significance or other matters protected by the *Environment Protection and Biodiversity Conservation Act* 1999 were likely to occur within the area of interest. The search included a 1 km buffer around the Site in all directions.

The results of the search indicated that six Threatened Ecological Communities have potential to exist within the area and surrounding areas, including:

- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion;
- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and Southeast Queensland ecological community;
- Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion;
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest;
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria; and
- Western Sydney Dry Rainforest and Moist Woodland on Shale threatened ecological communities.

There is scarce remnant vegetation throughout the Project area, however due to ongoing disturbance as a result of existing landfill operations, such vegetation is not considered optimal for habitat for native fauna.

The results of the Protected Matters Search Tool identified 38 threatened species and 15 migratory species which have the potential occur based on the presence of suitable habitat and records within the locality.

7.5.2 Impact assessment

No vegetation will be required to be cleared as party of the Modification Proposal. Due to the minimal environmental disturbance associated with the proposed works, it is considered highly unlikely that any significant impacts to flora and fauna would arise from the installation and operation of the gas collection system and LFG flare unit.

7.5.3 Mitigation Measures

Given the limited potential for any ecological impacts to occur, no recommendations for mitigation and management measures are warranted or provided in this SEE.

7.5.4 Conclusion

The Project is not likely to result in a significant impact on any threatened species or threatened ecological community listed under the BC Act or the EPBC Act. The Project is not anticipated to have any significant impact upon ecological values of the area and the environmental risk is considered to be negligible.

7.6 Aboriginal cultural heritage

Artefact Heritage was commissioned by Bingo Industries Pty Ltd to carry out an Aboriginal Heritage Due Diligence Assessment in support of the current Recycling Infrastructure Optimisation (Throughput Increase) Proposal. The Aboriginal Heritage Due Diligence Assessment was prepared to meet the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Due Diligence Code of Practice) (DECCW 2010), and include recommendations as to whether further archaeological investigation may be required in relation to the development modification application. A site inspection of the Eastern Creek REP was undertaken by Artefact Heritage on 8 March 2021.

The findings of the assessment carried out by Artefact Heritage have been reused in this Statement of Environmental Effects to identify the potential for impacts to Aboriginal cultural heritage values from the Modification Proposal.

7.6.1 Existing Environment

An extensive search of the Aboriginal Heritage Information System (AHIMS) was undertaken on 10 March 2021 by Artefact Heritage to determine the location of Aboriginal sites in relation to the current study area. The search included the study area and a surrounding one-kilometre buffer.

The search determined that there are 98 registered Aboriginal sites within the search area, but no recorded sites were located within the Site. The results of the search are shown in Figure 7.3.

7.6.2 Impact assessment

The due diligence assessment identified that, based on the Site survey, together with the evidence of the historical aerial photographs, the Site has been subject to past and continuing ground disturbance through quarrying and associated activities that have resulted in the complete modification of the ground surface. Overall, the study area is assessed as having nil to low Aboriginal archaeological potential and therefore, there are no impacts expected from the Modification Proposal.

7.6.3 Mitigation Measures

As the Modification Proposal area has been assessed as having nil to low Aboriginal archaeological potential no further mitigation is required. During construction, unexpected finds would be managed in accordance with the ECREP's existing Heritage Management Plan.

7.6.4 Conclusion

As the Modification Proposal area was found to be comprehensively disturbed and to have a nil-low potential for Aboriginal objects to be located within it, the Modification Proposal is not anticipated to have any significant impact upon Aboriginal heritage and the overall environmental risk is negligible.

Figure 7.3. Areas of archaeological potential.

Date	Revision	Drawn By	Site description	Jackson Environment and Planning Pty Ltd	Client	Bingo Industries Ltd
2/11/2021	Revision A	R. Loemker	1 Kangaroo Avenue Eastern Creek (Lot 1 DP 1145808 and Lot 2 DP 1247691)	Strategy | Infrastructure | Compliance | Procurement A: Suite 102, Level 1, 25-29 Berry St, North Sydney NSW 2060 E: admin@jacksonenvironment.com.au T: 02 8056 1849 W: http://www.jacksonenvironment.com.au	Project	Statement of Environmental Effects
					Title	Areas of archaeological potential
					Scale	As shown
					Source	Artefact Heritage

7.7 Visual

7.7.1 Existing Environment

The visual catchment surrounding the Site is varied, comprising commercial, industrial, rural and low-density residential land uses, undeveloped land, waterways, vegetated areas and transport infrastructure. The Eastern Creek Raceway and Prospect Reservoir are located approximately 2.5 km and 3.9 km to the east of the Site, respectively.

The edge of the quarry void is separated from sensitive land uses, such as residential by a distance of 490m and screening vegetation and the landscaped buffer adjacent to the M4 Motorway.

Existing earth berms on the north, west and southern boundaries have been reshaped to a height of at least 10m and vegetated, providing visual screening of the Site.

The original Environmental Assessment (*Environmental Resources Management Australia*, 2008) stated there was a limited number of receivers with views across the Site and changes to viewscapes resulting from the original project was relatively minor, as its visual character would be similar to other industrial facilities in the locality. The original Environmental Assessment also stated that retention of much of the Site's existing landscape features and the use of berms would minimise potential impacts to visual amenity. The Environmental Assessment concluded that the project would have a low/negligible visual impact on the viewscapes from residences in Minchinbury.

Currently, the facility has lighting to ensure a safe workplace. There is lighting around the MPCs, administration building and adjoining car park and along the current access road. There is considerable distance to the nearest residential receptors (some 430m) to the north in Minchinbury, the presence of 10 m high berms separating the facility from its surrounds and the M4 Western Motorway.

The DPE assessment report for Modification 4 concluded that lighting at the facility is mostly concealed from views by the berms that surround the Site from the former quarry operation.

7.7.2 Impact assessment

There is no expected visual impact from the proposal development at any of the received surrounding the site.

The flares will be approximately 8m high and located approximately 50m northeast of MPC1. Existing structures at the Site are taller than 8m and will shield the flare from view from areas to the west of the Site.

Existing earth berms on the north, west and southern boundaries have been reshaped to a height of at least 10m and vegetated, providing visual screening of the Site.

The view of the flare during night-time hours is unlikely to impact sensitive receptors (Erskine Park) due to the presence of higher bund contours between the access road and the sensitive receptors, and the light barrier of mature trees along Ropes Creek.

The combination of distance, berm height relative to light sources, and the filtering effect of the forested area along Ropes Creek, provide an effective mitigation of any visual impacts including light impacts at night.

7.7.3 Mitigation Measures

No visual impacts are anticipated from the modification proposal therefore no mitigation measures are required.

8. Potential for Cumulative Impacts

There are no predicted cumulative impacts as a result of the Modification Proposal. As discussed in the air quality impact assessment section (Section 7.1), there are no other sources of relevant air pollutants in the area that are likely to impact cumulatively with the Modification Proposal.

With specific reference to odour, the character of the odour potentially emitted from the site is characteristically 'rotten egg' in nature, notwithstanding that the purpose of the Modification Proposal is to significantly reduce those emissions. No other sources of significant hydrogen sulphide emissions have been identified in the area surrounding Site, and assessment of incremental impacts due to the operation of the Modification Proposal is sufficient to address that potential impact.

With respective to noise, the flare noise contribution is so low that it does not contribute to the overall noise level and therefore, cumulative impacts are not expected.

All other predicted environmental impacts are either low or negligible and there are no other sources of similar environmental impacts in the area that are likely to impact cumulatively with the Modification Proposal.

9. Summary of Mitigation Measures

Table 9.1 summarises the mitigation measures identified in this SEE to ameliorate impacts and safeguard the environment so that the desired environmental outcomes are achieved for the various components of the Modification Proposal.

Table 9.1. Summary of Mitigation Measures.

Issue	Mitigation Strategy
Air Quality	• Mitigation measures to be implemented in accordance with the existing Landfill Gas Management Plan (LGMP). • Air Quality, Odour and Greenhouse Gas Management Plan should be updated to capture all management measures in the LGMP.
Noise	• Noise during operation of the Modification Proposal should be checked biannually by carrying out compliance monitoring at locations in Minchinbury and Erskine Park in accordance with EPL 13426.
Hazard and risk	• Mitigation measures to be implemented in accordance with the existing Emergency Fire and Pollution Incident Response Management Plan. • Plan should be reviewed to ensure that all mitigation measures are captured.
Soil and water	• Mitigation measures to be implemented in accordance with the existing Soil, Water and Leachate Management Plan.

10. Capital Investment Value and Jobs

An estimated capital investment value associated with the Modification Proposal is provided in Appendix 7. The costs are related to the supply and installation of the gas collection system and flare and relevant upgrades.

The capital investment value for the Modification Proposal is $3,470,840 (ex. GST).

It is further estimated that Modification Proposal will create 3 full time equivalent jobs in the construction phase over a 7 month period, and 0.5 full time equivalent jobs during the operational phase.

11. Proposed amendments to existing conditions and any additional proposed conditions

The following new consent conditions are proposed to be included in the Modification of Development Consent Instrument:

- Condition 32 (new): The Proponent shall install and maintain a permanent gas flare system to provide an ongoing solution for the management of landfill gas generated by the landfill in accordance with the Statement of Environmental Effects prepared by Jackson Environment and Planning Pty Ltd dated 30/11/2021 and plans by Run Energy (Drawing No. 117-DN-008) and Bingo Industries (Drawing No. EAS-I-GA-LF-0002 Rev A).

The following existing consent conditions are proposed to be replaced as follows in the Modification of Development Consent Instrument (note wording removed is shown as a ~~strikethrough~~ and new wording is added in *italics*).

- Condition 39: The proponent must comply with the hours in Table 5:

Table 5: Hours of work.

Activity	Day	Time
Construction	Monday - Friday	7:00am to 6:00pm
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	Nil
MPC and PSE – Operation, waste receival, chute use and maintenance	Monday - Friday	24 hours
	Saturday	24 hours
	Sunday and Public Holidays	24 hours
SMA – Crushing and screening	Monday - Friday	6:00am to 6:00pm
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	8:00am to 4:00pm
SMA – Receipt of segregated materials	Monday - Friday	24 hours
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	8:00am to 4:00pm
Landfill – Truck deliveries	Monday - Friday	5:00am to 9:00pm
	Saturday	5:00am to 9:00pm
	Sunday and Public Holidays	5:00am to 9:00pm
Permanent landfill gas flare operation	*Monday - Friday*	*24 hours*
	Saturday	*24 hours*
	Sunday and Public Holidays	*24 hours*

12. Conclusions

Dial-A-Dump Industries (EC) Pty Ltd (a fully owned subsidiary of Bingo Industries Ltd) (DADEC) is the operator of the Eastern Creek Recycling Ecology Park (the Facility), located at 1 Kangaroo Ave, Eastern Creek NSW. The Eastern Creek Recycling Ecology Park is approved under MP 06_0139.

DADEC are seeking a development modification to install a gas collection system and a permanent landfill gas flare to support the operations of the Eastern Creek Recycling Ecology Park. The Modification Proposal involves the installation of two 1,500 m^3/hr high temperature, fully enclosed landfill gas ground flares and supporting infrastructure which will operate on a 24/7 basis.

The Modification Proposal seeks to build on the success of the temporary landfill gas collection and treatment system, providing a more permanent solution to reduce any potential environmental impact of gases. The permanent landfill gas flares will replace existing temporary flares that were installed on the landfill in response to odour complaints from April 2021. The permanent flares will also provide the Facility with future potential co-generation capabilities to reduce reliance on electricity during peak demand periods.

Under the variation of Environment Protection Licence 13426, issued on 10 September 2021, Condition U1.2(b) requires DADEC to submit all required documentation to the Department of Planning, Industry and Environment to implement and commission the proposed permanent flaring system (by 30 November 2021).

The Department of Planning, Industry and Environment has advised that the assessment of the Modification Proposal will be performed under a s4.55(1a) of the *Environmental Planning and Assessment Act* 1979. This approval pathway was confirmed in writing with the DPIE on 9 September 2021.

This Statement of Environmental Effects has been prepared to accompany the application for the Modification Proposal and addresses all of the Secretary's Environmental Assessment Requirements as recommended by DPIE on 9 September 2021. This Statement of Environmental Effects has evaluated the likely impacts and provides an overview of operational and environmental mitigation measures in terms of air quality, noise, hazard and risks, stormwater runoff quantity or quality, biodiversity, Aboriginal cultural heritage and visual amenity.

The Modification Proposal seeks to capture up to 85 percent of generated landfill gas and combust this gas with 98% destruction efficiency within two permanent, enclosed flares at a rate of 3,000 standard cubic metres per hour (50 percent more than the current temporary system).

The findings of the air quality impact assessment indicate that the concentrations of all pollutants assessed are below the NSW EPA air quality criteria, at all residential and industrial locations surrounding the Site. In relation to greenhouse gas emissions, the capture and treatment of methane results in emissions of CO_2e being 67% lower when compared to the uncontrolled and untreated release into the atmosphere. The Modification Proposal provides a preferential environmental outcome, when compared with a pre-landfill gas capture and treatment scenario.

The predicted operational noise levels for the Modification Proposal with the flare operating shows compliance with the operational approval noise limits for the day (7.00am-6.00pm), evening (6.00pm-10.00pm), night (10.00pm-5.00am) and morning shoulder (5.00am-7.00am) assessment periods. The flare noise contribution is so low that it does not contribute to the overall noise level.

The predicted construction noise levels associated with the construction of the flares and the existing Eastern Creek REP are compliant with the operational approval noise limits.

All other environmental aspects that may be affected by the Modification proposal have been assessed including hazard and risks, stormwater runoff quantity or quality, biodiversity, Aboriginal cultural heritage or visual amenity. It

has been determined that the Modification proposal will not impact or result in significant changes to hazard and risks, stormwater runoff quantity or quality, biodiversity, Aboriginal cultural heritage or visual amenity.

As part of the assessment process, the NSW Environment Protection Authority and Blacktown City Council were consulted on key environmental issues which may need to be considered in the Statement of Environmental Effects. The NSW EPA advised that no further specific environmental issues needed to be address and were satisfied to receive and review the final proposal. Bingo Industries Ltd have undertaken two briefings on November 17 and 29 respectively to Blacktown City Council prior to lodgement of this application. Blacktown City Council have also confirmed that they may accept Bingo's offer for a more detailed briefing on the permanent flare project post-lodgement of the Development Modification application with DPIE.

This Statement of Environmental Effects has given consideration to all relevant legislation and policies and has conducted an assessment of potential environmental impacts. It concludes that the Modification Proposal and its associated potential environmental impacts are unlikely to have a negative impact on the environment and all minor risks and impacts can be effectively managed through the implementation of mitigation measures during proposed works and during the long-term operation of the project.

Additionally, the reduction in GHG emissions as a result of the operation of Modification Proposal means the overall environmental impact is considered positive. Other positive benefits include the significantly reduced risk of sub-surface migration of landfill gas and potential for airborne odour at surrounding receivers.

The capital investment value for the Modification Proposal is $3,470,840 (ex. GST). It is further estimated that Modification Proposal will create 3 full time equivalent jobs in the construction phase over a 7 month period, and 0.5 full time equivalent jobs during the operational phase.

Given the overall positive environmental contribution expected from the Modification Proposal, the application is recommended for approval.

Appendix 1 – Owner's Consent Letter

Appendix 2 – Site plans and diagrams

Appendix 3 – Letter to NSW EPA

Appendix 4 – Blacktown City Council

Appendix 5 – Air Quality Impact Assessment and Greenhouse Gas Assessment

Appendix 6 – Noise Impact Assessment

Appendix 7 – Capital Investment Value Report