Bungendore High School
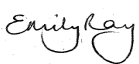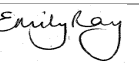
Odour Assessment

NSW Department of Education

March 14, 2025

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Acronyms and Abbreviations

Acronym/abbreviation	Full Name
BoM	Bureau of Meteorology
EPA	Environment Protection Authority
FIDOL	Frequency of the exposure Intensity of the odour Duration of the odour episodes Offensiveness of the odour Location of the source
GHD	GHD Pty Ltd
OU	Odour units
SCU	Standard cattle units
SSU	Standard sheep units

1.   Introduction

This Odour Impact Assessment (OIA) report has been prepared to support a Review of Environmental Factors (REF) for the NSW Department of Education (DoE) for the construction and operation of the new high school at Bungendore (the activity).

The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37A of the T&I SEPP.

This document has been prepared in accordance with the *Guidelines for Division 5.1 assessments* (the Guidelines) by the Department of Planning, Housing and Infrastructure (DPHI) as well as the *Addendum Division 5.1 guidelines for schools* and *Addendum October 2024 (Consideration of environmental factors for health services facilities and schools)*.

The purpose of this report is to evaluate environmental constraints and issues associated with the Bungendore High School educational and agricultural facilities (the Project). Future agricultural activities planned for the Site may influence the local environment and surrounding land uses, including potential impacts on environmental values and future surrounding sensitive receptors. To address these concerns, this report consolidates the findings of technical and environmental investigations and identifies key environmental risks that require further consideration during the development of the Project.

1.1   Scope and Limitations

GHD has included the below tasks as part of this OIA:

– Identify sources of emissions to air associated with the agricultural activities at the Site.
– Review assessment requirements and applicable odour criteria.
– Identify the locations of potential future sensitive receptors.
– Review of available local meteorological data to characterise the meteorological patterns in the region with the potential to impact on the dispersal of odour from the Project.
– Perform a qualitative assessment of potential odour impacts from the agricultural activities within the Site.
– Provide indicative in-principle mitigation and management measures to minimise the impacts.

This report: has been prepared by GHD for NSW Department of Education and may only be used and relied on by NSW Department of Education for the purpose agreed between GHD and NSW Department of Education as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than NSW Department of Education arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

1.2 Approach to Assessment

The odour assessment was prepared with consideration given to:

– Technical framework: assessment and management of odour from stationary sources in NSW (hereafter the Technical Framework) (NSW Department of Environment and Conservation, 2006a).

– Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (hereafter the Approved Methods) (Environment Protection Authority, 2022).

– Odour Review of Layer Farms and Development of S-factor Formula (Australian Eggs Limited, 2018).

– National procedures and guidelines for intensive sheep and lamb feeding systems (Meat & Livestock Australia Limited, 2011).

– Review of location settings and prevailing wind directions.

1.3 Assumptions

Assumptions regarding the Site operations have been made for the odour assessment as follows:

– Chicken operations:

- Operation Intensity: A maximum of 40 birds is assumed with a mix of pure-bred birds, layers, broilers and chickens.

- Location: All birds will be held in the pens within poultry shed (within the Agricultural Plot area - Refer Figure 2.2).

– Sheep Operations:

- Operation Intensity: A maximum of 15 sheep including breeding ewes, a ram, and lambs.

- Location: Most sheep will be held in the paddocks, ewes will be in the indoor pens during lambing (within the Agricultural Plot area – Refer section 2).

– Cattle Operations:

- Operation Intensity: A maximum of 3 cattle including steers and poddy calves.

- Location: Most cattle will be kept in the paddocks shared with sheep. Poddy calves will share the pens with ewes (within the Agricultural Plot area - Refer section 2)

– The agricultural classroom near the Agricultural Plot area is assumed to be plumbed to the enclosed wastewater system, ensuring no significant odour impact.

2. Project Overview

This odour assessment has been prepared to assess the odour impact on surrounding future residential areas near the new Bungendore High School (the Site). The proposed site is located approximately 2 kilometres north of the Bungendore Town Centre.

2.1 Site Description

The current street address is part of 18 Harp Avenue, Bungendore, NSW, 2621 (the site), and is legally described as part Lot 125 in Deposited Plan 1297613. As shown at Figure 2.1, the proposed school site forms part of a larger lot which is the subject of a proposed residential subdivision.

The site is located within the North Bungendore Precinct (Elm Grove Estate) in Bungendore. As a result of precinct wide rezonings, the surrounding locality is currently transitioning from a semi-rural residential area to an urbanised area with new low density residential development.

The site is zoned R2 Low Density Residential, with all adjoining land also zoned R2 Low Density Residential.

The site has three frontages:

- Approx 500m southern frontage to Birchfield Drive.
- Approx 500m northern frontage to Bridget Avenue.
- Approx 100m eastern frontage to Winyu Rise.

The site is currently cleared of all vegetation and consists of grassland, having been prepared for the purposes of future low density residential development.

2.2 Proposed Activity Description

The proposed activity is for the construction and operation of a new high school in Bungendore at part 18 Harp Avenue, Bungendore (the **site**). The new high school will accommodate 600 students and 68 staff. The school will provide 26 general learning spaces, and three support learning spaces across two buildings. The buildings will be predominantly three-storeys in height and will include permanent and support teaching spaces, specialist learning hubs, a library, administrative areas and a staff hub.

Additional core facilities are also proposed including a standalone school hall with covered outdoor learning area (**COLA**), a car park, a kiss and drop zone along Birchfield Drive, sports courts and a sports field. The new school also features a single storey building with associated paddocks in the far western portion of the site designed for livestock management and hands-on agricultural learning.

Specifically, the proposal involves the following:

- Building A, a three-storey learning hub accommodating general learning spaces, a special education learning unit (**SELU**), a physical education centre, a performing arts space, and other core facilities including administrative areas, staff hub, library and end of trip facilities.
- Building B, a part three/part four storey learning hub accommodating general learning spaces, specialist workshops for food, textile, wood and metal workshops, as well as visual arts studios, science labs and staff areas.
- Building C, a standalone school hall with COLA.
- Building D, a single-storey agricultural block comprising an animal storage space, a COLA and internal workshop.
- On-site staff car park with 50 spaces with access via Bridget Avenue.

- Kiss and drop zones and bus bays along Birchfield Drive.

- Open play space including a sports courts and sports field.

- Associated utilities and services including a 1000kv padmount substation.

- Main pedestrian entrance to be located off Birchfield Drive.

- Secondary pedestrian access from Bridget Avenue.

- Public domain/off-site works including the removal of street trees.

The design has been masterplanned to allow for an additional future stage. The second stage does not form part of this proposal.

Figure 2.2 provides an extract of the proposed site plan.
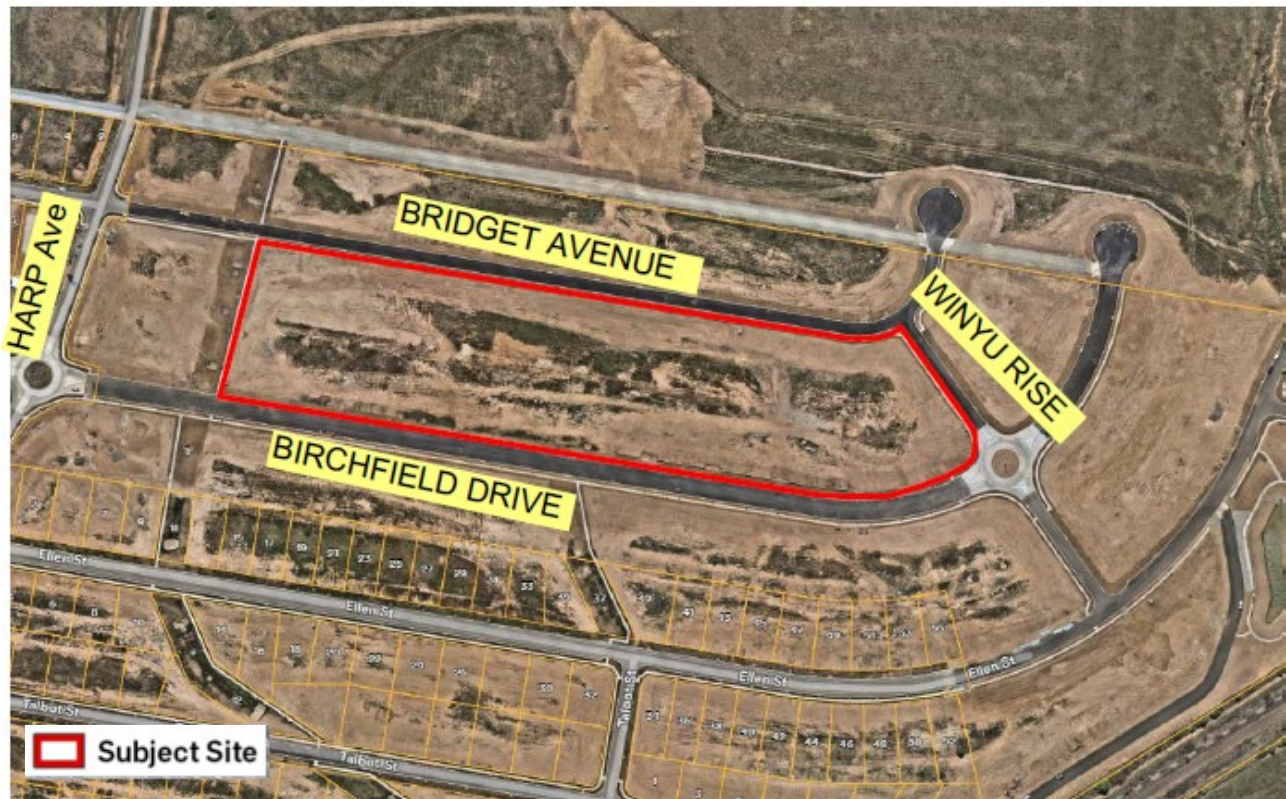
Source: Urbis, 2024
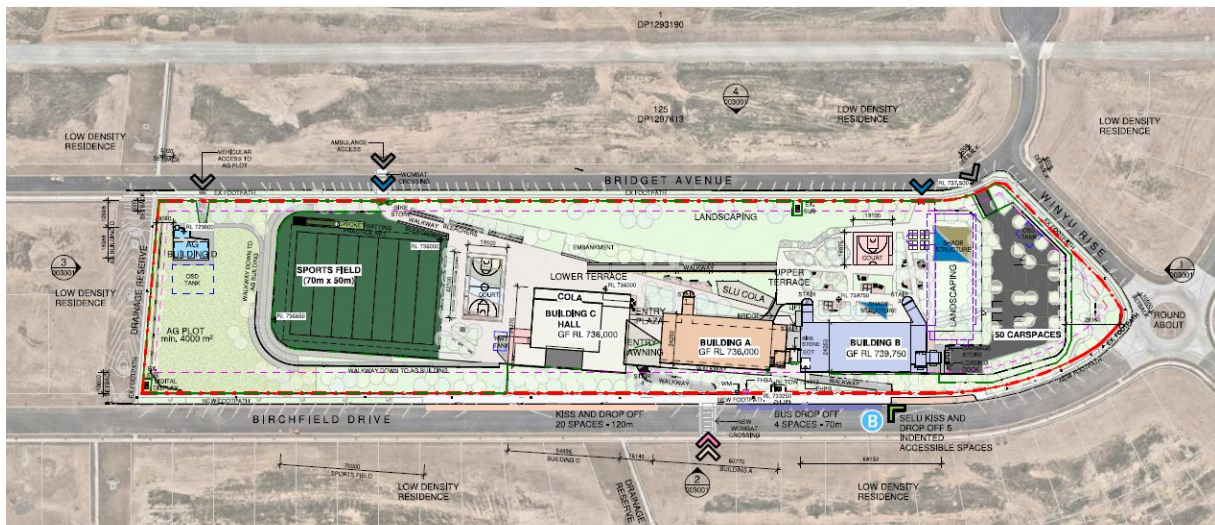
Figure 2.1   Aerial Photograph of the Site

Source: NBRS, 2024

Figure 2.2   Site Plan

2.3   Identified Odour Sources

Odour generated from future agricultural activities at the Site including livestock, waste, and wastewater handling, has the potential to affect the amenity of residents in surrounding planned residential areas. This is particularly relevant given the reduced buffer distance between odorous activities and residential areas. The main odour generating sources are located in the Agriculture Plot (AG Plot) on the west side of the site shown in Figure 2.2.

The main activities at the proposed High School that could contribute to odour impacts include:

– Livestock activities:

- Poultry: Up to 40 birds, including a mix of pure-bred birds, layers, broilers and chicks housed in pens.
- Sheep: A maximum of 15 sheep including breeding ewes, a ram, and lambs, with access to a lambing shed and 4-5 paddocks.
- Cattle: Seasonal housing of up to 3 Steers and 2 poddy calves annually (maximum of 3 cattle at any time).

– Animal waste management: Collection and handling of liquid and solid waste from poultry pens and sheep/calf pens

– Effluent disposal: Proper handling and treatment of liquid waste

– Composting

3.   Odour Criteria

The Technical Framework offers guidance for industry consent authorities, environmental regulators and odour specialists on assessing and managing activities that emit odour. The Technical Framework adopts the odour assessment criteria in the Approved methods.

The impact assessment criteria for odour are applied at the nearest existing or likely future off-site sensitive receptor. The Approved Methods defines odour assessment criteria (measured in odour units (OU)) and specifies how they should be applied in dispersion modelling to assess the likelihood of nuisance impacts arising from the emission of odour.

Odour impact is a subjective experience and has been found to depend on many factors, the most important of which are:

–   Frequency of the exposure

–   Intensity of the odour

–   Duration of the odour episodes

–   Offensiveness of the odour

–   Location of the source

These factors are often referred to as the 'FIDOL' factors.

The odour assessment criteria are defined to take account of two of these factors (F is set at 99th percentile; I is set between 2 to 7 OU). The choice of assessment criteria is also dependent on the population of the affected area, as shown in Table 3.1.

Table 3.1   Odour assessment criteria in the Approved Methods

Population of the affected community	Odour performance criteria (nose response odour certainty units at 99th percentile[1])
Single residence (≤ ~2)	7
~ 10	6
~ 30	5
~ 125	4
~ 500	3
Urban (≥~2,000)	2

Source: The Approved Methods (Environment Protection Authority, 2022)

The criteria assume that an odour concentration of 7 OU at the 99th percentile is generally acceptable to the average person. However, as the size of the exposed population increases, the likelihood of encountering more sensitive individuals also rises. For larger populations exceeding 2,000 people, a more stringent criterion of 2 OU at the 99th percentile is considered appropriate to account for greater sensitivity.

Given the Site allocation and the proposed residential zoning at its surrounds, the odour criterion of 3 OU is deemed suitable for assessing potential odour impacts. This standard would apply to all surrounding residential areas to ensure the protection of community amenity (including the school buildings located at the eastern portion of the Site).

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[1] This is a prediction of the odour level that may occur 99 per cent of the time, or that is below these criteria for 99 hours in every 100. Odour performance criteria are designed to be precautionary, so that impacts on sensitive receivers can be minimised.

4. Existing Environment

4.1 Local Topographical Features

Local topography plays a crucial role in air quality assessments, as it can affect atmospheric dispersion through mechanisms such as night-time katabatic drainage flows from higher elevations and channelling effects in valleys or gullies.

The Site's topography is relatively flat, with elevations of approximately 740 meters Australian Height Datum (AHD). Figure 4.1 illustrates the area surrounding the Site.
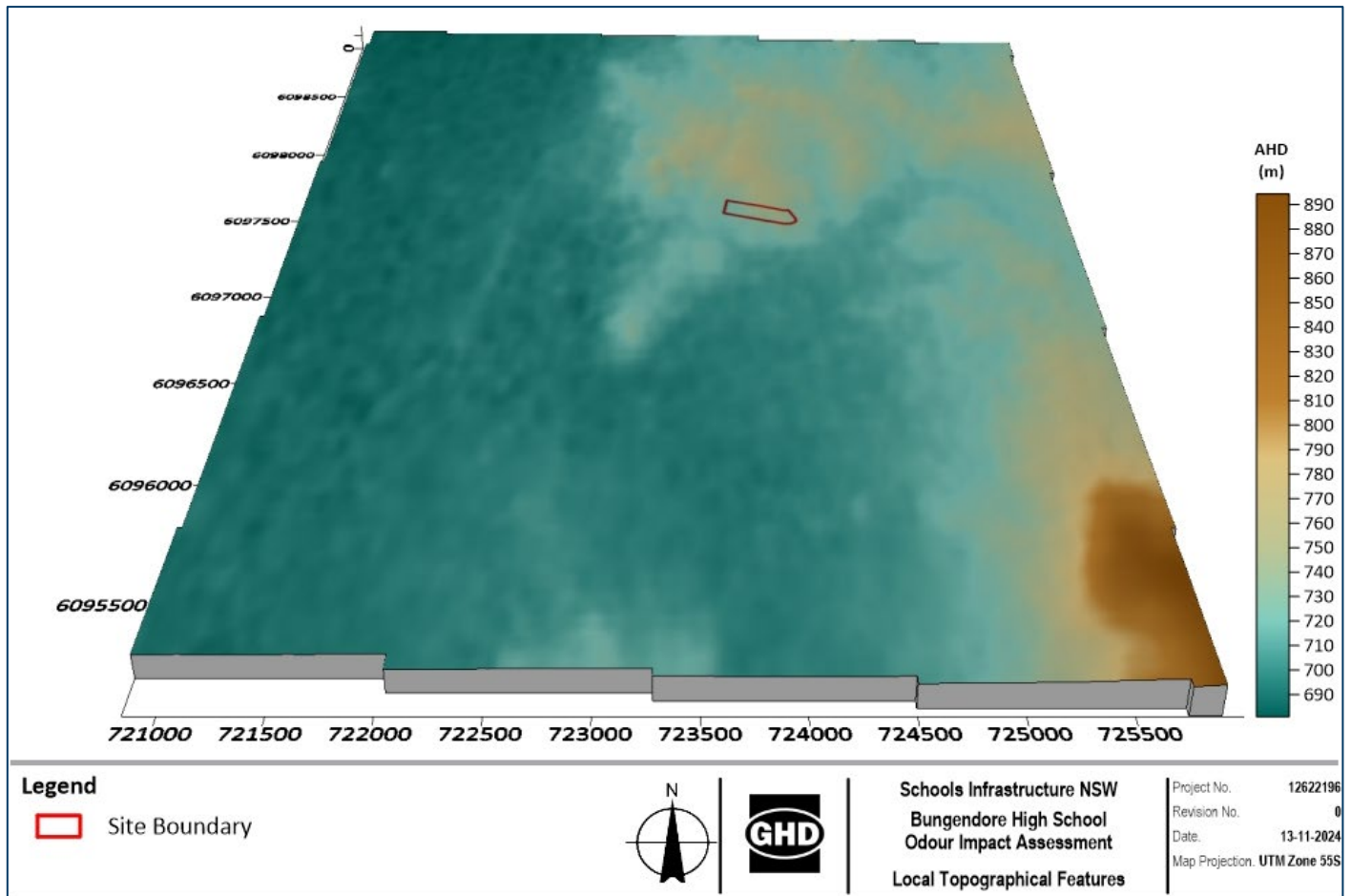
Figure 4.1   Local Topographical Features

4.2 Surrounding Land Zoning and Nearest Sensitive Receptors

As shown in Figure 4.2, the Site and the immediate lands to its east, west, and south are zoned as R2 (Low Density Residential). There are lands zoned as RU1 (Primary Production) to the north, east, and west of the Site beyond the R2 areas.

Determining odour impact involves assessing the size of the potentially affected population. According to the setback requirements for dwelling houses specified in the Bungendore High School Development Control Plan (DCP), a minimum setback of 7 m is required from the front of residential properties (Urbis, 2022). For this assessment, it is

assumed that all residential receptors will face Bridget Avenue and Birchfield Drive. Considering the 7 m setback from the roads, the distance between the boundaries of the AG Plot and the planned R2-zoned residential dwellings to the north and south of the AG Plot is approximately 25 m to 40 m.

Additionally, the area west of the AG Plot is designated as a drainage reserve, which is not suitable for residential development. Consequently, a separation distance of 25 m is maintained between the western boundary of the AG Plot and the drainage reserve.

In conclusion, the planned residential receptors will be situated at distances ranging from 25 m to 40 m from the boundary of the AG Plot (Refer to Figure 2.2).
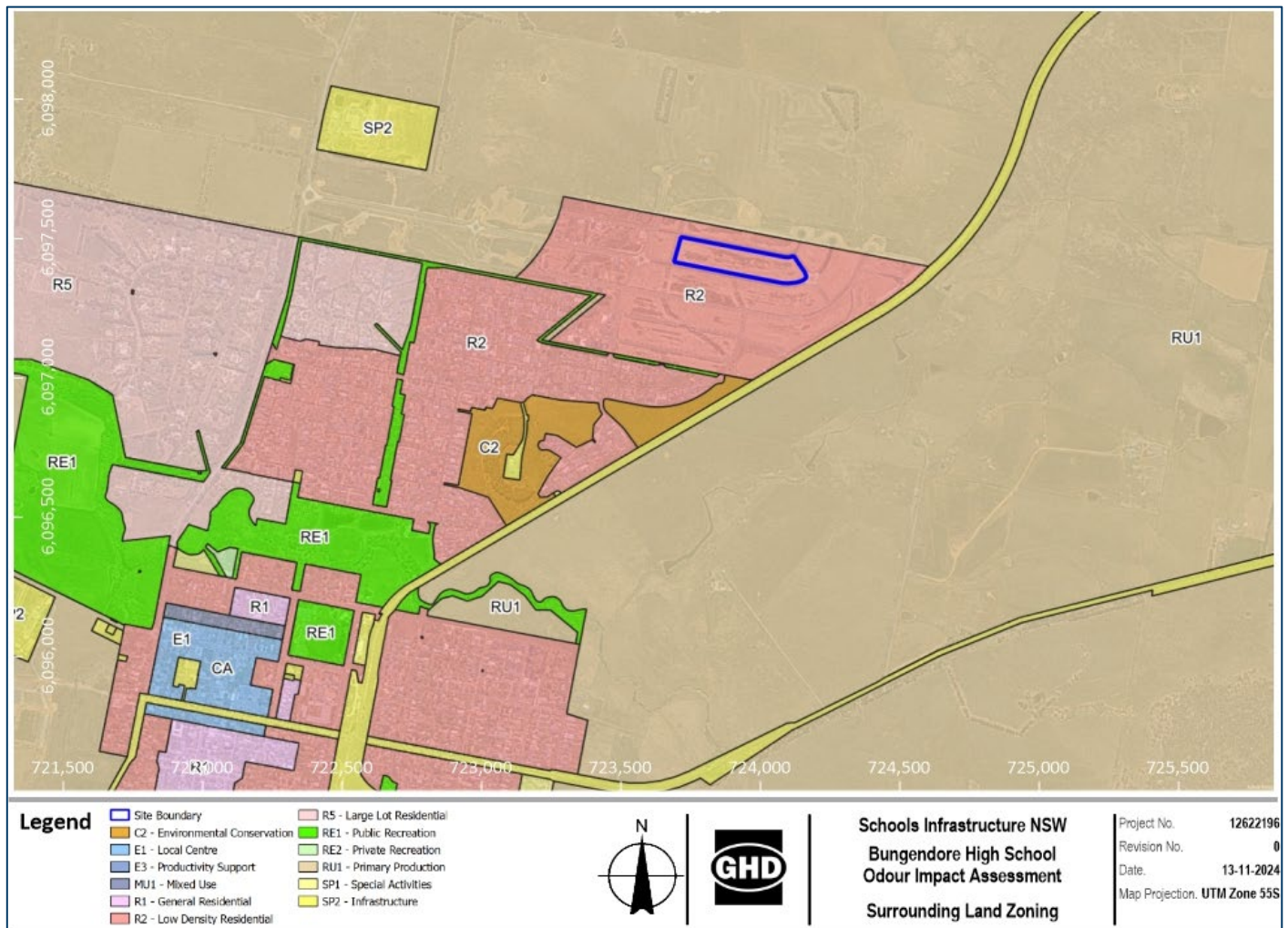

Figure 4.2   *Surrounding Land Zoning*

4.3   Prevailing Wind Directions

Prevailing wind directions provide an indication of downwind directions from any operations with air emissions that are likely to potentially be more frequently impacted. Local wind speed and direction influence the dispersion of air pollutants and odour. Wind speed determines both the distance of downwind transport and the rate of dilution as a result of 'plume' stretching. Wind direction, and the variability in wind direction, determines the general path pollutants will follow and the extent of crosswind spreading.

The closest meteorological observations are from the Bureau of Meteorology (BoM) Canberra Airport station, located approximately 25 km from the Site. Given that the terrain between the Site and the BoM station is relatively flat, these observations are considered representative for this assessment.

Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from North). The bar at the top of each wind rose diagram represents winds blowing from the north (i.e. northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. Thus, it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

The annual wind rose for the Canberra Airport station provided in Figure 4.3, shows prevailing winds from the northwestern and southeastern quadrants, along with the lowest frequency of winds from southwest direction.

Future residential receptors are planned to be situated to the east, west, and south of the Site. Odour dispersion in these residential areas is likely to be influenced by prevailing winds from the west, east, and north. As shown in Figure 4.3, the frequency of these winds ranged between 5% and 13% over a five-year period, indicating their potential role in odour transport.
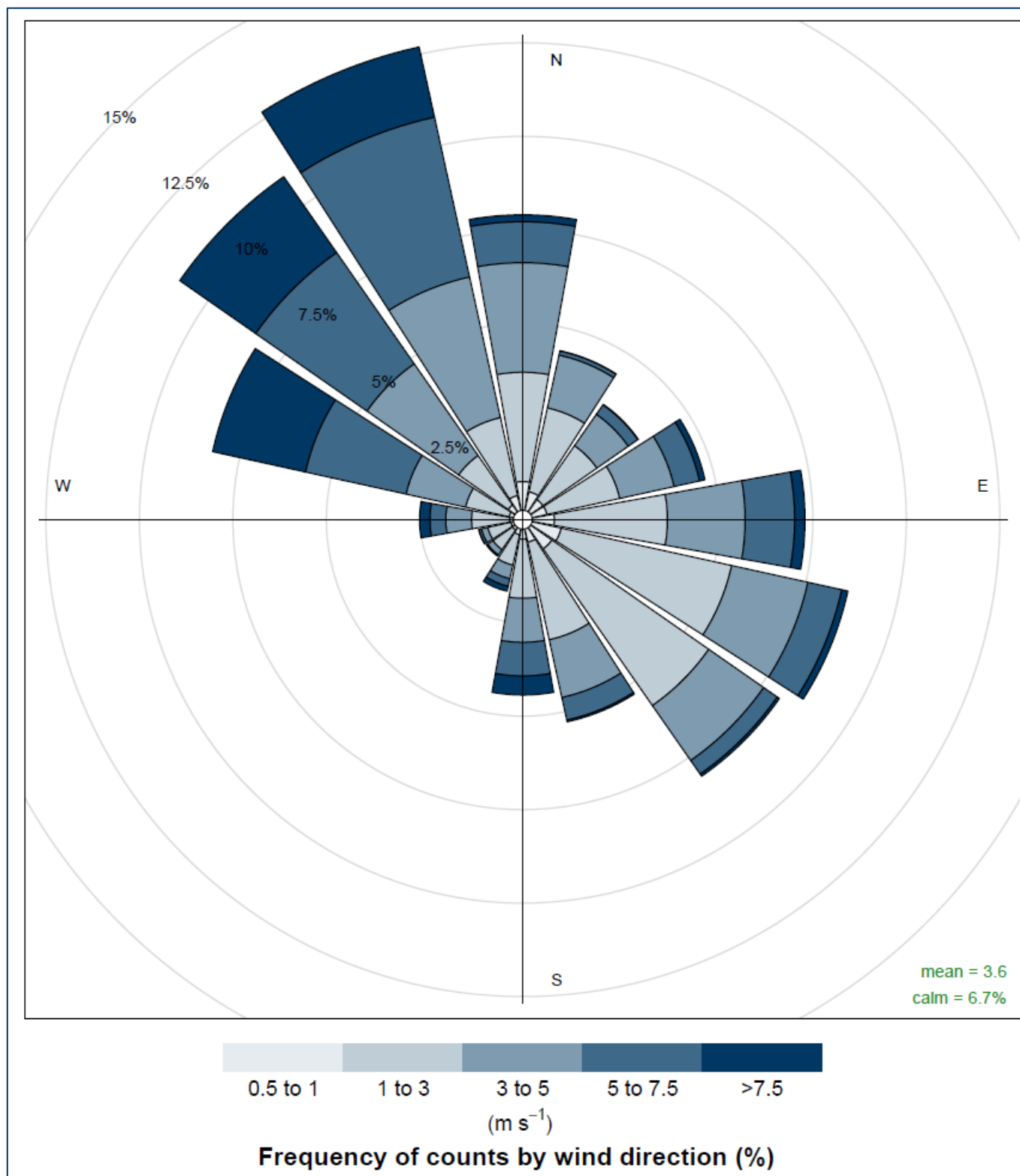
Figure 4.3   *Annual Average wind rose collected from Canberra Airport Station (2019-2023)*

4.4   Existing Odour Environment

A desktop review was conducted to identify industrial facilities surrounding the Site that could potentially emit significant odour. This review involved mapping industrial sites regulated by the EPA and examining facilities required to report to the National Pollutant Inventory (NPI).

The search of the EPA public register and NPI database identified one potentially odour-generating facility within a 2 km radius of the Site being the Bungendore Resource Recovery Facility (the Facility). The location of the Facility is shown in Figure 4.4.

To evaluate potential odour impacts from the Facility, it was necessary to determine the required separation distance and assess whether any of the planned residential receptors near the Site fall within this distance.

In the absence of NSW EPA-specific separation guidelines for such facilities, reference was made to guidelines established by other regulatory bodies in Australia. The separation distance requirements for material recycling facilities are outlined in Table 4.1.

Table 4.1   List of separation distances for material recycling facilities set by Australian authorities

Industry Type	Description	Recommended Separation Distance (m)
ACT Government (ACT Government, 2018)		
Materials recovery facility*	Collecting, dismantling, treating, processing, storing or recycling used or surplus materials	300
NT EPA (Northern Territory Environment Protection Authority, 2017)		
Materials recovery and recycling facility	Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	Case by case but generally, ≥ 150 m
SA EPA (Southern Australia Environment Protection Authority, 2016)		
Waste recovery facility	A waste recovery facility includes a transfer station and material recovery facility that receives solid or liquid waste for preliminary treatment prior to its transfer elsewhere for reuse, further treatment, or disposal. Preliminary treatment includes sorting, aggregating, compacting, baling or packaging the waste or matter prior to its transfer elsewhere for lawful reuse, further treatment or disposal. Potential impacts depend on the type of waste or matter being treated but could include noise, dust and odour.	300

As shown in Figure 4.4, the distance between the Facility and the Site ensures that none of the planned residential receptors fall within the required separation distance. Consequently, the Facility is not expected to have significant incremental odour impacts on the planned residential areas. Therefore, this OIA focuses solely on potential odour emissions from activities within the Site itself.
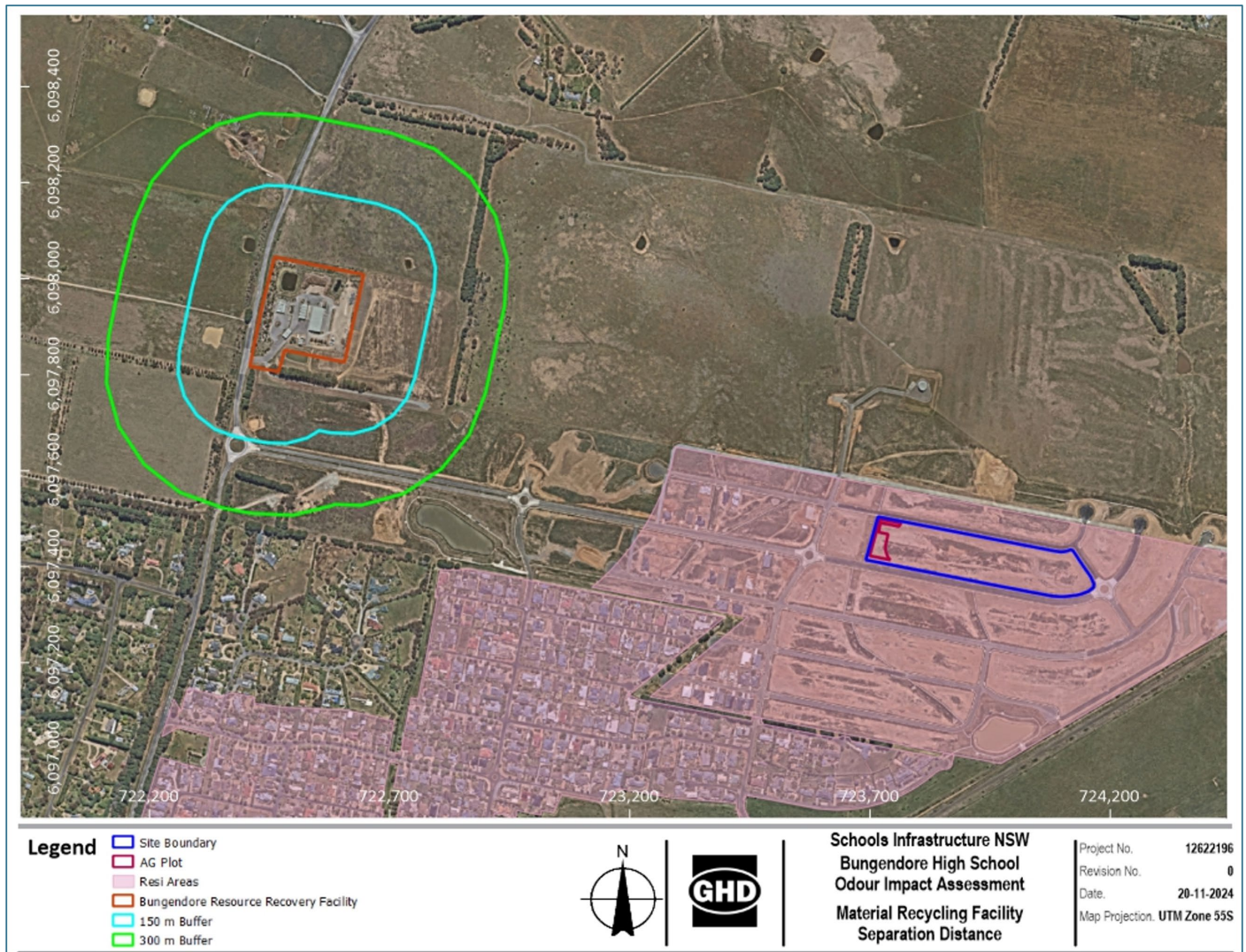
Figure 4.4   *Nearest waste facility separation distance*

5. Odour Assessment

5.1 Screening based on separation distances from livestock activities

5.1.1 Chickens

The potential for poultry pens to impact the planned residential areas was assessed in accordance with the Technical Framework. The Technical Framework references an accompanying document, Technical notes Assessment and management of odour from stationary sources in NSW (NSW Department of Environment and Conservation, 2006a)(hereafter the Technical Notes) which provides detailed guidance and specific methods to assess odour from broiler chicken farms. As the AG Plot has layer chickens, GHD has used guidance from Odour Review of Layer Farms and Development of S-factor Formula (Australian Eggs Limited, 2018) to estimate an appropriate odour buffer from poultry pens at the Site.

Although the chicken sheds are relatively small compared to commercial operations and the applicability of the screening methodology to this scale may be limited, the calculations have been undertaken to evaluate potential odour impacts. Assumptions used and results of the screening calculation are provided in Table 5.1.

$$Separation\ Distance = (Number\ of\ birds/1,000)^{0.63} \times S1 \times S2 \times S3 \times S4\ (Optional)$$

Table 5.1   Separation distance calculation for chickens

Parameter	Value	Comment
Number of birds (N)	40	Provided by the Client
Sensitive land use factor (S1)	20	Sensitive land use (within a rural zone)
Surface roughness factor (S2)	1.0	Limited groundcover/short/grass/cropland, few trees
Terrain weighting factor (S3)	1.2	Low relief from Site
Wind frequency factor (S4)	1.0	Not adjusted.
Separation distance (m)	**3.2**	**-**

Based on the provided guidance, the required separation distance to minimise the risk of odour impacts is calculated to be 3.2 m. As discussed in Section 4.2, the nearest planned dwellings which are located approximately 25 m north and west of the AG Plot boundary, significantly exceed this distance. Therefore, odour emissions from chickens are expected to be negligible and no specific mitigation measures are recommended.
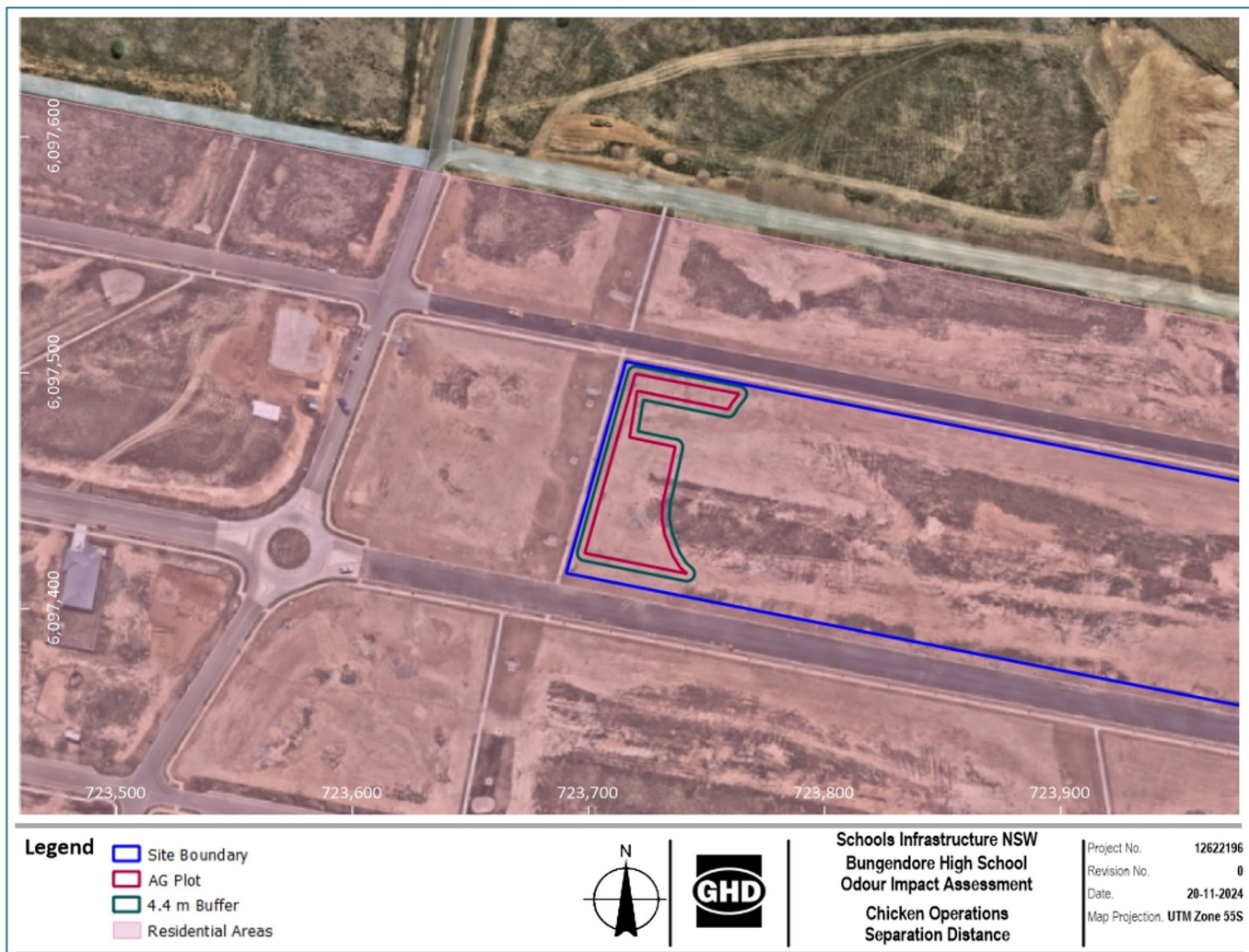
Figure 5.1   Chicken Operations Separation Distance

5.1.2   Cattle

The potential for odour impact from cattle and the dairy on the planned residential areas was assessed in accordance with the Technical Notes, which outlines specific methods for assessing odour from cattle feedlots. Since the cattle onsite are not fed in a feedlot setting, the assessment is considered conservative. Screening-level calculations have been undertaken to confirm that offensive odour emissions from cattle are unlikely to result in unreasonable impacts on the surrounding community.

A level 1 assessment is performed by calculating the required separation distance from the cattle operations (the holding area) using the equation provided below. The S factor values used in the calculation are detailed in Table 5.2.

$$Separation\ Distance = \sqrt{N} \times S\ (S1 \times S2 \times S3 \times S4 \times S5)$$

The minimum area of the AG Plot is 4,000 m^2, equating to a stocking density of over 1,000 m^2 per head of cattle. Given that the S1 factor is 40 for a stocking density of 20 m^2 per head, it can be reasonably extrapolated that S1 would be less than 10 under this scenario. To account for the worst-case scenario, S1 value of 10 has been conservatively adopted.

Table 5.2   Separation distance calculation for cattle

Parameter	Value for future receptors northwest, southwest and southeast	Value for future receptors northeast	Comment
Number of cattle	3	3	Provided by the Client
Average cattle weight	600 kg	600 kg	Assumed
Standard cattle unit (SCU) per cattle	1.0	1.0	Table 7.1 Technical Framework
Total SCU	3 SCU	3 SCU	Calculated
Stocking density	>20 m^2/cow	>20 m^2/cow	Calculated
Rainfall	717 mm	717 mm	BoM Canberra Airport
Feedlot class	1	1	Highest standard of design, operation, maintenance, pad management and cleaning frequency
Stocking density factor(S1)	10	10	Extrapolated
Receptor factor (S2)	1.2	1.2	Medium towns, 500–2000 persons
Terrain factor (S3)	1.2	1.2	Low relief
Vegetation factor (S4)	1.0	1.0	Crops only, no tree cover
Wind frequency factor (S5)	1.0	0.7	Normal winds towards the receptors to the southeast, southwest, and northwest Low winds towards the receptors to the northeast
Separation distance (m)	**25**	**17**	-

As outlined in Table 5.2, the required separation distances to minimise the risk of odour impacts are approximately 25 m for the planned residential areas located to the northwest, southwest and southeast, and 17 m for those to the

northeast of the Site. Based on the assessment undertaken, any potential odour impacts would mostly be from the AG Building making the existing buffer even greater.

As observed in Figure 5.2, neither of the calculated separation distances encroach upon surrounding dwellings. According to the discussions presented in Section 4.3, conductive winds carrying the odour emissions from the Site towards the most impacted receptors occur less than 10% of the time. Furthermore, given that the cattle are not planned to stay in the feedlot situation, the calculated separation distance represents a conservative buffer between the cattle operations and the surrounding community.
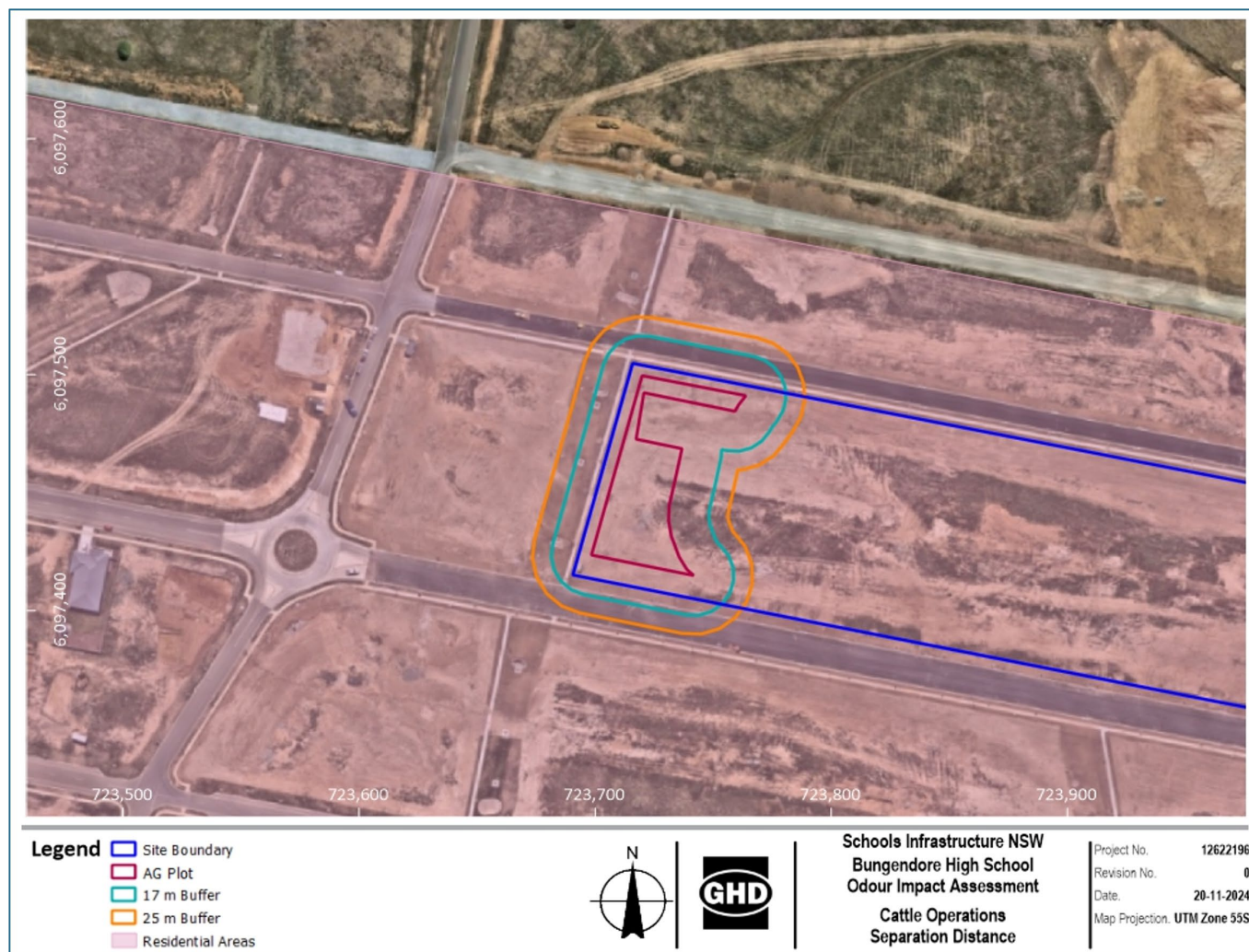

Figure 5.2   Cattle Operations Separation Distances

Mitigation measures to minimize and manage odour from the cattle operations are provided in Section 6 .

5.1.3   Sheep

In the absence of separation distance guidelines for sheep in the Technical Note, reference has been made to the National Procedure and Guidelines for Intensive Sheep and Lamb Feeding Systems (Meat & Livestock Australia Limited, 2011) (National Sheep Guideline). Screening level assessment has been performed to evaluate whether odour emissions from cattle operations are likely to cause significant impacts on the surrounding community.

A level 1 assessment has been performed by calculating the required minimum separation distance from the sheep operations using the below equation. Relevant assumptions used to develop the S factor are outlined in Table 5.3.

$$\textit{Separation Distance} = \sqrt{N} \times S \, (S1 \times S2 \times S3 \times S4)$$

The AG Plot covers a minimum of 4,000 m², which corresponds to a stocking density of more than 250 m² per sheep. Given that the S1 factor is 26.6 at a stocking density of 4 m² per sheep, it can be inferred by extrapolation that the S1 factor would be less than 6 in this case. To account for the worst-case scenario, a conservative value of 6 has been applied for S1.

Table 5.3   Separation distance calculation for sheep

Parameter	Value for future receptors	Comment
Number of sheep	15	Provided by the Client
Average sheep weight	18.6 kg	The average weight of 3 adult breeding ewes (45 kg/sheep) and 12 lambs (12 kg/sheep)
Standard sheep unit (SSU) per sheep lower than 25 kg	0.519 SSU	Table 6-2 National Sheep Guideline
Total SSU	7.785 SSU	Calculated
Stocking density	Over 4 m²/SSU	Lowest density used
Rainfall	717 mm	BoM Canberra Airport
Feedlot class	1	Highest standard of design, operation, maintenance, pad management and cleaning frequency
Stocking density factor(S1)	6	Class 1 and over 4m²/SSU
Receptor factor (S2)	1.2	Towns (100 - 2000)
Terrain factor (S3)	1.2	Low relief
Vegetation factor (S4)	1.0	Pasture, crops, no trees
Separation distance (m)	**24**	**-**

The calculated separation distance to mitigate the risk of odour impacts from the sheep operations to the surrounding planned residential areas is approximately 24 m. As discussed in Section 4.2, the closest planned residential dwellings to the AG Plot are located approximately 25 m to its north and west. Therefore, it is concluded that the 24 m separation distance does not encroach upon any of these receptors. Based on the assessment undertaken, any potential odour impacts would mostly be from the AG Building making the existing buffer even greater.

The figures provided for sheep operations represent a worst-case scenario, as the sheep will not be housed in a feedlot. This indicates that the potential for odour impacts on nearby residential areas if adequate design and operational management measures are not implemented.

Since sheep and cattle will share the pens in the lambing shed, same recommendations for cattle will also apply to sheep.

Mitigation measures are provided in Section 6 in order to minimize and manage odour from the sheep operations.
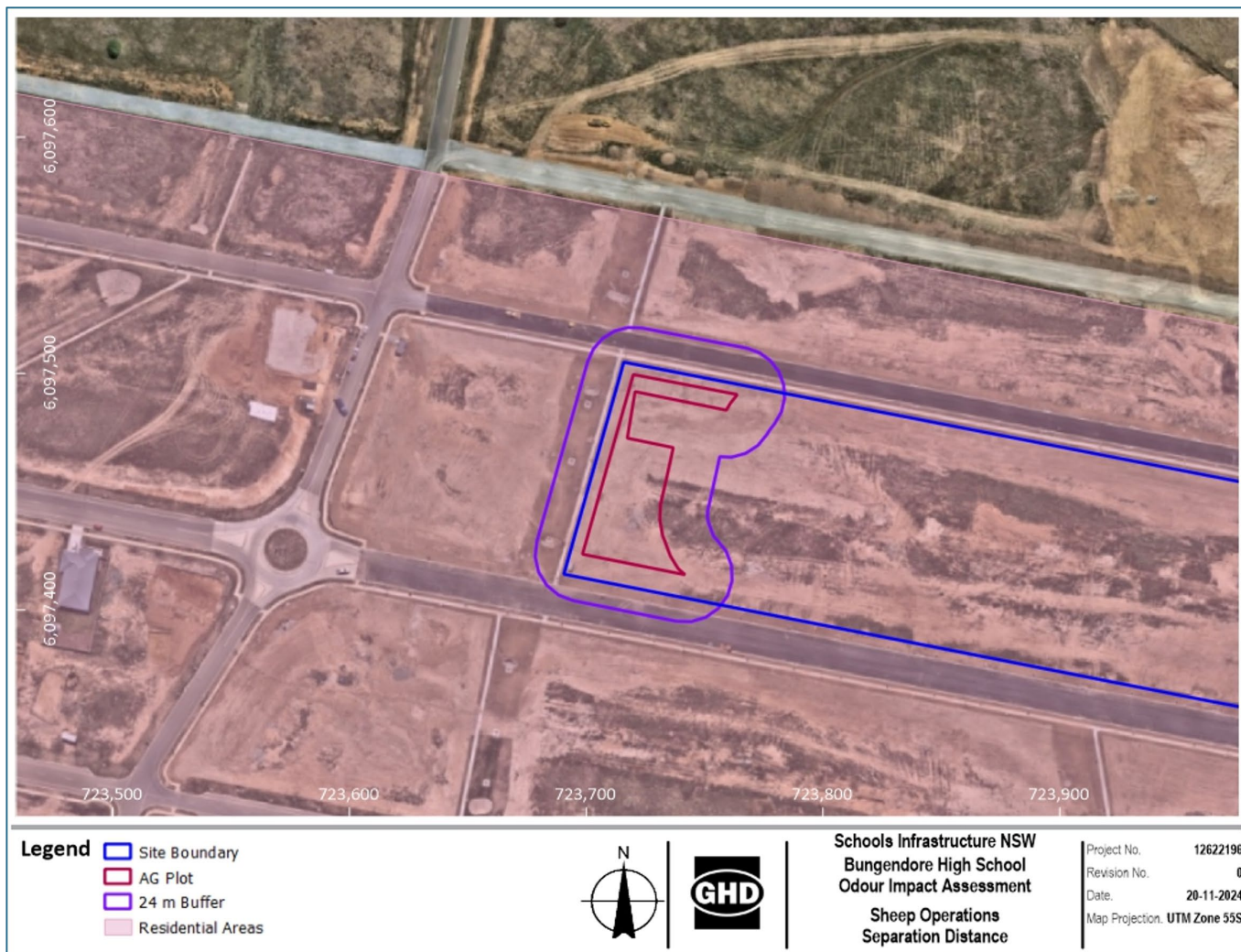
Figure 5.3   *Sheep Operations Separation Distances*

5.2   Odour Impacts from Animal Waste Management

The primary sources of odour from the proposed AG Plot are anticipated to be the bedding and animal manure. The poultry pens will be cleaned every 2 to 3 weeks, while the sheep and poddy calf pens will be cleaned weekly, particularly during lambing, hosting, or adverse weather conditions. The maximum number of animals on Site will be limited to 58, consisting of 40 birds, 15 sheep, and 3 cattle.

A comparable odour assessment conducted at RNSW West Gosford for 112 horses indicated that, based on the worst-case dispersion results the odour level decreases to 2 OU at a distance of approximately 50 m from the West Gosford site boundary (GHD, 2024). This level is below the established threshold for nearby residential areas and school buildings (refer section 3).

Given that the Site will accommodate a significantly smaller number of animals, and these animals will be of smaller size than those assessed at West Gosford, it can be anticipated that the distance required to reach the 2 OU threshold will be shorter for the Site, which is expected to be less than 50m.

5.3   Odour Impacts from Effluent Management

Effluent management is identified as a potential source of odour from the Site, with the possibility of causing short term elevated odour impacts on surrounding planned residential areas.

The proposed effluent management system is designed to capture wastewater from poultry, sheep and cattle operations. Under the proposed system, wastewater from handwashing sinks, troughs, and animal pens cleaning activities is directed to the paddocks for natural dispersal.

Key odour risks associated with the system include emissions from effluent storage and treatment, as well as from the land application of effluent. It is anticipated that an effluent storage tank would be constructed if bathrooms are included in the nearby farm classroom, facilitating the capture of odorous emissions and the collection of biogases.

5.4   Odour Impacts from Composting

Materials from the animal pens that will likely be composted include:

– Wood shavings from poultry pens
– Straw from sheep/poddy calf pens

Estimated quantities of all wastes going to compost are not yet known. Composting can be a source of odour, and the process will generally take up to 12 weeks. Key reasons leading to elevated odour from composting can include:

– Lack of aeration causing the pile to become anaerobic
– Moving or turning the pile can cause short term spikes in odour, this should be carried out during favourable meteorological conditions
– Not having an appropriate mix of materials being composted

The composting location, currently planned for the eastern side of the AG Plot adjacent to the garden bed, is located over 40 m from the nearest planned residential dwellings. Given the anticipated low volumes of composting material, significant odour impacts are unlikely. However once the specific quantities of material are determined, a detailed odour assessment in accordance with the Approved Methods may be necessary to evaluate the need for mitigation measures, such as enclosed composting systems.

6.   Mitigation Measures

Based on the high-level review of odour from the Site, the following mitigation measures are required (Table 6.1):

Table 6.1   Mitigation measures

Mitigation Name	Aspect/Section	Mitigation Measure	Reason for Mitigation Measure
Odour management plan	Prior to commencement of operation	An odour management plan be prepared which ensures regular cleaning of bedding and manure. The frequency of cleaning and changeover of animal bedding would be based on the type and quantity of animals being housed.	To minimize the potential for odour generation and maintain a high standard of hygiene.
Effluent management	Prior to commencement of operation	Investigate building an enclosed effluent storage tank within the Site.	To reduce odour potential from the tank.
Composting activities	Prior to commencement of operation	Locate the composting activities on the eastern portion of the AG parcel, near the vegetable beds.	To reduce odour potential to surrounding residential areas and to utilize the composted materials in the vegetable beds.
Field odour surveys	After the commencement of operation	Undertake field odour surveys during operational phases with the main objectives being: • The extent of the odour plume, • The intensity of the odour, and The characteristics of the detected odours.	To confirm the absence of odour and ensure the effectiveness of odour control measures.

7.　　Evaluation of Environmental Impacts

An odour impact assessment was conducted for the Bungendore High School AG Plot to evaluate potential impacts on the surrounding planned residential areas. The findings of the assessment are summarised as follows:

– A screening-level odour assessment, based on the proposed numbers of chickens, cattle, and sheep, concludes:

- Separation distances would apply from the AG Building or any other areas where animals are housed or group in a more intensive manner for extended periods, rather than the general AG Plot.

- The calculated separation distances to mitigate odour impacts from cattle are approximately 25 m to the northwest, southwest, and southeast, and 17 m to the northeast. Given a required 7 m front setback for the surrounding planned dwellings, neither of these separation distances extend into the planned residential areas.

- The required separation distance to mitigate odour impacts from sheep is approximately 24 m, which also falls within the buffer between the Site boundaries and the nearest future dwellings. As with the cattle, given the limited scale of sheep operations and the conservative nature of the separation distance calculations, significant odour impacts are not expected.

- Odour from chickens is considered negligible, and no specific mitigation measures are recommended.

- Sheep and cattle pens may pose a moderate odour risk if used for extended periods; however, this assessment is based on assumptions typically associated with large-scale feedlots. Given the smaller scale of operations at the site, the actual odour levels from these pens are expected to be considerably lower.

- Additional potential odour sources include animal waste, the effluent management system, and composting operations. To address these, several mitigation measures have been proposed to effectively manage and minimise any potential odour nuisance.

– Based on the findings of the assessment, no impacts are anticipated beyond 25 m from key animal holding areas. If any future residential dwellings are proposed within this distance then additional assessment may be required.

The extent and nature of potential impacts are low and will not likely have significant impact on the locality, community and/or the environment. Potential impacts can be appropriately mitigated or managed to ensure that there is minimal impact on the locality, community and/or the environment.

8. References

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