Agricultural Assessment

Proposed Solar Farm - Naring Hall Road - Numurkah

Green Gold Energy

Cadeema

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1 EXECUTIVE SUMMARY

Cadeema undertook an Agricultural Assessment of the 21.68 allotment (referred to herein as '*the site*') which is proposed for development as a solar farm by the owners, Green Gold Energy. This assessment found/concluded the following.

The Site

1. The site consists predominantly of open agricultural grazing/cropping land with limited scattered remnant and planted trees and has been developed for border check (gravity flood) irrigation

2. 25% of the site could sustain good productivity irrigated agriculture, 30% of the site could sustain moderate productivity irrigated agriculture and due to flooding and soil type, 45% of the site is not suitable for commercial irrigated agriculture

3. The site was owned for the past 18 years by Mr Carlo Sortino (*the Landholder*) who owns the adjoining 36.03 ha allotment to the east (referred to '*Lot 1*'); Both allotments were utilised as a dairy farm for 16 years from 2002 to 2018

4. Over the above-mentioned 16 years, the site was utilised for 'shoulder' irrigated annual winter fodder crops & periodic dryland grazing providing feed to the dairying operation centred on Lot 1

5. The site is currently used for dryland annual winter fodder cropping and when inspected (March 2020) consisted of weeds grazed by beef cattle

6. From an agricultural utility perspective, the site is typical of average, mediocre, agricultural land throughout the Goulburn Murray Irrigation District (GMID)

Irrigation

7. Pre 2010 the site was serviced by irrigation through a dedicated GMW spur channel and a Small Metered Outlet located midway along the western boundary

8. In 2010-2012 the site and Lot 1 were both included in a single Round 1 On Farm Efficiency Program project which saw the majority of funds spent on accessing water & on Lot 1, with less than 10% of funds utilised on the site and only 1 irrigation water outlet (MV6071) allocated for the two allotments

9. According to GMW, the delivery share (1.69 ML/day), the Water-use Licence (329.2 ML) and the irrigation service are simultaneously attributed to both the site and to Lot 1 through outlet MV6071

10. In 2020, due to the absence of a dedicated irrigation water supply for Lot 1, the Landholder formed a water access easement on the site to facilitate water access for Lot 1, has retained metered outlet MV6071 and the associated irrigation service for Lot 1 & sold the site to Green Gold Energy

11. Historical irrigation water use & land utilisation on the site/Lot 1 since 2009 was not unusual and correlated with climatic variables, irrigation water price/availability, dairy milk market volatility and dairy milking herd number fluctuations of the Landholders dairy herd

12. The history of infrastructure investment, and the associated land and water use, across both allotments shows the majority of irrigation water utilisation, investment and farm production focused on Lot 1 rather than on the site

13. The site is not currently considered to be serviced by irrigation water supply because the On Farm Efficiency Program project did not retain an irrigation water outlet for each allotment, the project allocated metered outlet MV6071 to both allotments simultaneously and the Landholder has retained metered outlet MV6071 for Lot 1

14. The site consists of border check (gravity flood) irrigation infrastructure funded by the On Farm Efficiency Program and the majority of this will remain intact with site solar farm development

15. It is likely that, if the site is to be irrigated in the future, a significant proportion of the irrigation infrastructure funded by the On Farm Efficiency Program could be utilised to irrigate the site

16. If the site is to be irrigated in the future, an application to GMW for irrigation water supply and payment for any associated metered outlet would be required

Solar Farm Impacts on Agriculture & Irrigation

17. Converting the site from historical irrigated agriculture, current dryland agriculture or potential future irrigated/non-irrigated agriculture, to the proposed solar farm will not significantly compromise the On Farm Efficiency Program investments on the site

18. Converting site land used to the proposed solar farm is not likely to adversely impact site land use economics or segregation of the site/surrounding allotment land uses

19. The proposed conversion of the site from agriculture to a solar farm is not likely to adversely impact district irrigation water supply, be this in the local district, the GMID or in the Murray Darling Basin

20. Converting the site from irrigated agriculture to the proposed solar farm is not likely to yield adverse impacts to land use and/or the economics of the district, the GMIB, or the Murray Darling Basin

Conclusions Solar Farm Impacts on Agriculture & Irrigation

21. The site does not consist of highly productive agricultural land and is typical of average, mediocre, agricultural land throughout the GMID

22. Historically the site has been used for annual pasture and fodder crop production and not for higher value perennial pasture or perennial crop production

23. Over the past 18 years, site/Lot 1 irrigation water use, investment in irrigation infrastructure and farm production were focused on Lot 1 rather than on the site

24. While the site is currently not serviced by surface irrigation water supply, development of the site for a solar farm will see the majority of existing On Farm Efficiency Program funded irrigation infrastructure retained

25. The site could still be irrigated in the future providing a successful application to GMW for irrigation water supply and the payment and installation of a metered outlet

26. Converting the site to the proposed solar farm will not significantly compromise On Farm Efficiency Program investments

27. This detailed Agricultural Assessment indicates no adverse impacts to agriculture or irrigation are likely to result from a change in land use on the site to the proposed solar farm in the local district, in the GMID or in the Murray Darling Basin

Details are in the report.

2 INTRODUCTION

An Agricultural, Soil and Water Scientist from Cadeema (Cliff Dillon) undertook an Agricultural Assessment of Crown Allotment Part 38; Lot 2; PS 613623U; Section F; Parish of Katunga which covers 21.68 ha, is located on the north side of the Naring Hall Road approximately 4.5 km northeast of Numurkah in north central Victoria (*Appendix A - Locality Plan*), and which is referred to herein as '*the site*' (*Image 1*). Mr Dillon is an appropriately qualified and experienced scientist with more than 20 years experience assessing agricultural sites. The site is proposed for development for an approximately 5 MW solar farm by Green Gold Energy who own the site.

The purpose of the Agricultural Assessment was to provide an independent assessment of the agricultural and irrigation utility of the site, and to assess the likely impacts of site development for the proposed solar farm on district irrigation viability and the resulting reduction in area available for agricultural use compared with irrigated agricultural land in the Goulburn Murray Irrigation District (GMID).

In undertaking this assessment, Cadeema staff undertook a desktop assessment of infrastructure, soils and relevant environmental features on or surrounding the site (*Appendix B - District Plan*). A site visit and inspection were undertaken on Wednesday 11th of March 2020 (*Appendix C - Site Plan*). An interview of the previous landholder (Mr Carlo Sortino (referred to herein as '*the Landholder*')), who owns the adjoining allotment to the east (referred to herein as '*Lot 1*') (*Appendix D - Title Plan*), was undertaken. The site inspection included subsurface investigations to verify soil types, inspection of the adjoining allotment to the east, and the inspection of infrastructure on and surrounding the site, particularly infrastructure relating to irrigation water supply, drainage and access. This report outlines the results of the Agricultural Assessment of the site.

Image 1: *The site consists predominantly of open agricultural grazing and cropping land.*

3 SITE AGRICULTURAL ASSESSMENT

3.1 The Site

As detailed in the Introduction, the site (Crown Allotment Part 38; Lot 2; PS 613623U; Section F; Parish of Katunga) covers 21.68 ha and is located on the north side of the Naring Hall Road approximately 4.5 km northeast of Numurkah (*Appendix A - Locality Plan; Appendix B - District Plan*). The site is bordered to the north, east and west by dry land and irrigated agricultural grazing and cropping land. As can be discerned on the Site Plan in the appendices (*Appendix C - Site Plan*), the site consists of 450 metres of frontage to the Naring Hall Road which is a formed, gravel all-weather road. Access is gained via a culvert and gateway located in approximately the centre of this road frontage. The site consists predominantly of open agricultural grazing/cropping land and has been developed for border check (gravity flood) irrigation. Pertinent history pertaining to the site over the past approximately 18 years is provided in the Appendices (*Appendix E - Pertinent Site History*). Information on district and site soils are also provided in the appendices (*Appendix F - Soil Classes & Soil Suitability for Crops*; *Appendix G - Soil Map*).

The site is in the Goulburn Murray Irrigation District (GMID) and was historically serviced by irrigation and drainage by Goulburn Murray Water (GMW). The main features of the site include a farm irrigation water supply channel along the western boundary, a shallow earthen spoon drain along the eastern boundary, several remnant native trees, several stands of planted established trees, concrete stock drinking water supply troughs and wooden post and wire stock fencing. At the time of the field inspection (Wednesday 11th of March 2020) the site consisted of winter crop stubble and weeds and was being utilised for beef cattle grazing (*Image 2*).

Image 2: *At the time of the field inspection, the site consisted of remnants of a winter crop and weeds (March 2020).*

3.2 Pertinent Features

Topography – The site consists of an even and slight natural surface slope from west to east. This slope has been enhanced with land forming (laser grading) for border check (gravity flood) irrigation.

Drainage – The site is relatively well drained with excess surface water flowing from west to east. Excess surface water is then conveyed in shallow, earthen, trafficable, 'spoon' drains into the community surface drainage system immediately east of the site (*Appendix C - Site Plan*). Excess surface water in this drainage system typically flows from north to south, under the Naring Hall Road, and to the south (*Appendix B - District Plan*). The majority (75%) of the soils are not particularly well drained and can remain waterlogged for extended periods during prolonged wet climatic periods.

Drainage Easements - The site consists of two 15 metre wide drainage easements along the internal northern boundary and internal southern boundary, the latter fronting Naring Hall Road (*Appendix D - Title Plan*). These two drainage easements facilitate removal of excess surface water from adjoining properties to the west. These drainage easements convey excess surface water to the aforementioned community surface drain immediately east of the site.

Flooding – Approximately 40% of the site is covered by the Flood Overlay as detailed on the Flooding Plan in the appendices (*Appendix H - Flooding Plan*). This area of the site is subject to flooding in wet climatic periods when excess surface water builds up in the aforementioned community surface drain and backs up across the site.

Access – The site has adequate all weather access from the adjoining Naring Hall Road (*Image 3*).

Image 3: *Looking west from the southeast corner of the site with the gravel, all weather Naring Hall Road on the left, the southern boundary fence line and scattered remnant Grey Box (Eucalyptus microcarpa) trees.*

Soil Assessments – Soils on the site were assessed by an experienced Soil Scientist using a shovel and a 100 mm diameter hand soil augur. This facilitated classification of the soils into Soil Types and Soil Classes, the latter facilitating determination of soil productivity potential and soil crop suitability (*Appendix F - Soil Classes & Soil Suitability for Crops*). Soils across the district and the site are well documented and well understood, resulting in a predictable soil catena and sequence of Soil Types.

Soil Mapping – The above-mentioned soil assessments indicated that the Soil Types across the site approximately align with those from the 1942 Soil Map (*Appendix G - Soil Map*). This was also the case with the Soil Types across Lot 1 however, the area of the Cobram Loam Soil Type in the west of Lot 1 covers a greater area to the north, south and east than that depicted on the Soil Map.

Soils – The soils on the site are derived from Quaternary (Shepparton Formation), alluvium, riverine, deposits resulting in Duplex Red-Brown Earths & Vertisols with shallow (6 to 16 cm) loam to clay loam surface soils with an abrupt change to clay dominant subsoils.

Soil Classes – As detailed in the Appendices (*Appendix E - Pertinent Site History*), approximately 45% of the site consists of soils which are not considered suitable for commercial irrigated agriculture and which have very low productivity potential. Approximately 30% of the site consists of soils with moderate productivity potential which are generally suitable for irrigation and a range of agricultural field crops. The remaining approximately 25% of the site consists of soils with good productivity potential which are suitable for most irrigated agricultural crops (*Appendix F - Soil Classes & Soil Suitability for Crops*).

Soil Chemistry – Whilst the soils were not analysed in the laboratory for soil chemical characteristics, the soil chemical status is likely to be poor with low soil nutrition and low soil chemical stability which would need to be enhanced to be conducive to achieving satisfactory agricultural yields.

Salinity – No evidence of salinity was found on the site during the site inspection and the soils on this site are not particularly susceptible to adverse impacts from salinity.

Sodicity – Because of the high clay content and low permeability of the majority of the soils on the site, the soils are susceptible to adverse impacts from sodicity. It is likely that the soils would benefit from gypsum applications to enhance soil structure and soil profile permeability which would in turn increase the agricultural utility of the site.

Shallow Groundwater – No evidence of adverse impacts from groundwater and no evidence of groundwater occurring at depths shallower than 3 m below the surface were observed during the site inspection.

Vermin – During the site visit, there was no evidence of excessive vermin (rabbit, fox, rat etc.) infestations on the site.

Weeds – At the time of the site inspection, the majority of the site was covered with a range of weed species including Couch Grass, Heliotrope, Caltrop, Bathurst Bur, Barley Grass, Scotch Thistle, Clammy

Goose Foot, Hog Weed, Dock, Barnyard Grass, Marshmallow, Milk Thistle, Wild Oats, Cape Weed and Erodium (*Images 1 & 2*).

Trees – Whilst the majority of the site has historically been cleared for agriculture, several large, remnant Grey Box (*Eucalyptus microcarpa*) trees remain on the site (*Image 4*). These are predominantly loan trees scattered adjacent to the site boundaries. There is approximately a dozen of these trees with the majority occurring near the northern boundary of the site. In addition to these remnant trees, an approximately 180 m long line of planted native trees along an irrigation check bank is located approximately 160 metres north of the southern boundary of the site (*Image 5*). There are also approximately 5 willow trees along an irrigation check bank in the west of the site (*Image 6*).

Image 4: *Several scattered remnant Grey Box (Eucalyptus microcarpa) trees occur in the north of the site.*

Image 5: *An approximately 180 m long line of planted native trees along an irrigation check bank are located approximately 160 metres north of the southern boundary of the site.*

Image 6: *Approximately 5 willow trees are located along an irrigation check bank in the west of the site.*

3.3 Land Use

The 45% of the site, located on the eastern half of the site, consists of low lying, high clay content soils which are subject to flooding, are not suitable for commercial irrigated agriculture and which are suited to low intensity dryland grazing and/or opportunistic cropping only. The remaining areas of the site consist of good soils suitable to a range of agriculture and are suitable for grazing of annual and perennial pastures, annual winter and summer fodder crops, annual winter grain crops, most row crops, lucerne, and a range of more waterlogging tolerant horticultural crops. The site is not likely to be suitable for high-value, intensely managed, waterlogging sensitive, horticultural crops.

According to the Landholder, over the past approximately 18 years, the site has been utilised for 'shoulder' irrigated annual winter fodder crops to provide feed for dairy cattle along with periodic dryland grazing. Over the past 2 years, the site has been utilised for a dryland annual winter fodder crop and for dryland grazing of agisted beef cattle.

As detailed earlier, at the time of the site inspection, the site consisted of the remains of the 2019 dryland annual winter fodder crop and weeds which were grazed by beef cattle.

3.4 Agricultural Utility

From an agricultural utility perspective, the site has the advantages of predominantly cleared land with adequate topography, surface drainage and access, a proportion of suitable soils, no adverse impacts from salinity or shallow groundwater, and no evidence of vermin (*Image 7*). The agricultural utility of the site is reduced due to the significant proportion of heavy textured, poorly drained soils, a significant proportion of soils unsuitable for commercial irrigated agriculture, the propensity for flooding, a

propensity for sodicity, and significant weed infestations (*Image 8*). Based on experience, the site is typical of average, mediocre, agricultural land throughout the GMID.

Image 7: *Approximately 55% of the site is suitable for a range of irrigated agriculture and is typical of average, mediocre, agricultural land throughout the GMID.*

Image 8: *Approximately 45% of the site consists of heavy textured, poorly drained soils subject to flooding and sodicity which are unsuitable for commercial irrigated agriculture and are only suited to low intensity dryland grazing and/or opportunistic cropping.*

4 SITE IRRIGATION ASSESSMENT

4.1 Irrigation Service History

Pertinent history relating to irrigation services and irrigation development on the site is provided in the Appendices (*Appendix E - Pertinent Site History*). Whilst full details are provided in the appendices and reference should be made to this, key factors relating to irrigation infrastructure and irrigation service history include:

1. The site has access to excess surface water drainage facilitated through the adjoining (immediately to the east) community surface water drain (*Appendix D - Title Plan*)

2. Pre 2010 the site was serviced by irrigation through a dedicated GMW spur channel and a Small Metered Outlet located midway along the western boundary

3. In 2010-2012 the site and Lot 1 were both included in a single Round 1 On Farm Efficiency Program project (*Table 1*)

4. Whilst water savings from the On Farm Efficiency Program were calculated across both the site and Lot 1, the majority of these water savings were realised from Lot 1 and the majority of funds were spent on Lot 1 as Lot 1 constituted the larger proportion of the Landholder's property, consisted of a higher proportion of better soils, was closer to the farm agricultural infrastructure base (house, dairy, shedding etc.) and was designed for higher (more intense) production

5. The majority of funds from the On Farm Efficiency Program were spent on replacing the GMW 'spur' channel between the site and the 6/6 channel with a privately owned pipeline, and on irrigation infrastructure (sump, pump pit, pump, pipeline, pipe and riser irrigation system, land forming etc.) on Lot 1

6. Less than 10% of the On Farm Efficiency Program funds were utilised on the site and these facilitated improvement of the existing gravity border check (flood) irrigation system which included enhancement of an existing farm irrigation water supply channel, installation of fast flow 'Padman' irrigation bay outlets and earthworks associated with land forming (laser grading) of the land to facilitate gravity irrigation

7. As part of this On Farm Efficiency Program, only 1 outlet (MV6071) (refer to *Appendix B - District Plan*) for two allotments (the site & Lot 1) was provided; this was against the wishes of the Landholder who requested to retain the two existing outlets

8. According to GMW, '*There is delivery share of 1.690 ml/day and a Water-use Licence of 329.2 ml for service ID: 8004914 relating to lots 1 & 2 on PS613623U.*' Which indicates that the right to access irrigation water under these conditions is simultaneously attributed to both the site and to Lot 1 through metered outlet MV6071

9. Because of the absence of dedicated irrigation water supply for Lot 1, in 2020 the Landholder formed a water access easement on the site to enable irrigation water to be conveyed from the western boundary of the site to Lot 1 which then facilitated irrigation water access for Lot 1 independent of the site (an action the Landholder was forced to take because the On Farm Efficiency Program project only provided one outlet for two allotments)

10. The Landholder has retained metered outlet MV6071, the associated delivery share and the associated water use licence for Lot 1

11. In 2020, the Landholder sold the site to Green Gold Energy with the understanding that the site no longer had access to a surface irrigation water supply

This history of infrastructure investment, and the associated land and water use, across both allotments shows the majority of irrigation water utilisation, investment and farm production focused on Lot 1 rather than on the site. Had the On Farm Efficiency Program undertaken separate projects for each allotment and/or retained an irrigation water outlet for each allotment, this distribution would be clearer.

4.2 Irrigation Water Use History

Pertinent history relating to irrigation water use on the site is provided in the Appendices (*Appendix E - Pertinent Site History*). Whilst full details are provided in the appendices and reference should be made to this, key factors relating to irrigation water use include:

12. The Landholder had a 169 ML high reliability water entitlement in 2007 at the time of 'unbundling' (the separation of water entitlement from land)

13. The Landholder utilised low volumes (8 to 23 ML) of irrigation water from 2009 to 2011 (inclusive) because milking herd numbers had been significantly reduced due to the preceding drought and supplementary feeding occurred (*Table 1*)

14. Between 2010 and 2012 the Landholder significantly increased milking herd numbers

15. In 2012 the Landholder had a significantly larger milking herd, ceased supplementary feeding, produced the majority of feed on farm and therefore utilised a significantly higher volume (261 ML) of irrigation water

16. In participating in Round 1 of the On Farm Efficiency Program, the Landholder sold (relinquished) 69 ML of water entitlement leaving the Landholder with 100 ML of high reliability water entitlement

17. From 2013 to 2018, the Landholder irrigated significant volumes (279 to 414 ML) of irrigation water to support a larger milking herd with most feed produced on farm

18. In 2018, due to the combination of reducing milk prices, increasing water prices, increasing farm input costs and deteriorating health, the Landholder dispersed the dairy herd, sold all remaining 100 ML of high reliability water entitlement and ceased intensive agricultural production

19. The volume of irrigation water utilised between 2009 and 2020 varied depending on climatic variables, plant water requirements, the price and availability of irrigation water and on farm agricultural production levels

20. The majority of this irrigation water (> 90%) was utilised on Lot 1 as this allotment consists of a higher proportion of better soils, is closer to the agricultural infrastructure, had an easier to operate pipe and riser irrigation delivery system and was utilised for higher productivity pastures by comparison with the site

This pattern of water use and land utilisation over this period was not unusual and correlated with farm commodity prices, climatic variables, irrigation water price/availability and dairy milk market volatility. The Landholder utilised very little water when temporary water prices were very high in 2008 to 2009 ($170 to $550 / ML), utilised very little water during the Round 1 On Farm Efficiency Program due to the associated irrigation system disruptions, significantly increased irrigation water use from 2012 to 2018 when temporary water prices were low in 2012 to 2015 ($15 to $150 / ML), and when temporary water

prices were moderate in 2015 to 2018 ($80 to $300 / ML), and stopped irrigation when temporary water prices were very high in 2018 to 2020 ($300 to $600 / ML). This history of water and land use across both allotments shows the majority of irrigation water utilisation and farm production focused on Lot 1 rather than on the site.

Table 1; *Historical events relating to the site, Lot 1, water entitlement and water use.*

Date[1]	Event	Water Entitlement[2]	Water Use[3]
2002	Lot 1 & the site purchased by Landholder as one allotment	169 ML	-
2007	The site (Lot 2) subdivided from Lot 1 (*Appendix D - Title Plan*)	169 ML	-
2007	Unbundling of water rights	169 ML	-
2009	Dairying with low herd numbers & supplementary feeding	169 ML	8 ML
2010	Dairying, supplementary feeding & increasing herd numbers	169 ML	20 ML
2011	Dairying, supplementary feeding & increasing herd numbers	169 ML	23 ML
2012	Dairying with higher herd numbers & no supplementary feeding	100 ML	261 ML
2010-2012	Landholder participates in the On-Farm Efficiency Program	100 ML	-
2013	Dairying & producing most feed on farm	100 ML	393 ML
2014	Dairying & producing most feed on farm	100 ML	375 ML
2015	Dairying & producing most feed on farm	100 ML	414 ML
2016	Dairying & producing most feed on farm	100 ML	355 ML
2017	Dairying & producing most feed on farm	100 ML	279 ML
2018	Dairying, then disperse herd & sell water entitlement	100 ML	345 ML
2019	Modernisation sees channels to the east of Lot 1 piped	0 ML	83 ML
2020	Create easement across the site to supply water to Lot 1	0 ML	0 ML

[1] approximate dates only

[2] water entitlement attached to Lot 1 (pre 2007) and then owned by the Landholder (post 2007)

[3] water use (on the Site & on Lot 1) reported by GMW; assumed to be for a calendar year (covering 2 half irrigation seasons)

4.3 Irrigation Layout

As detailed in preceding sections, the site was developed for gravity, border check (flood) irrigation prior to participating in Round 1 of the On Farm Efficiency Program in 2010 to 2012. This is borne out by historical aerial photography. As also detailed above, implementation of the On Farm Efficiency Program on the site facilitated improvement of the existing gravity, border check (flood) irrigation system and included enhancement of the existing farm irrigation water supply channel along the western boundary of the site, replacement of the existing irrigation bay outlets with fast flow 'Padman' irrigation bay outlets and earthworks associated with land forming (laser grading) of the land to facilitate gravity irrigation. These features, along with check banks, trees, the 11 irrigation bays and several non-irrigated areas (*Image 1*) in the northeast of the site can be discerned on the Site Plan in the Appendices (*Appendix C - Site Plan*). The location of the farm irrigation water supply channel, location and configuration of drains and the orientation and number of irrigation bays differed little prior to and post the On Farm Efficiency Program project. This is also borne out by historical aerial photography.

The gravity, border check (flood) irrigation system on the site currently consists of an earthen farm irrigation water supply channel along the western boundary and north-western corner of the site (*Image 9*), 11 fast flow 'Padman' irrigation bay outlets (*Image 10*), an irrigation channel 'check' (*Image 11*), 11 laser-graded irrigation bays (*Image 7*), small earthen check banks (*Image 7*), and shallow, trafficable, earthen 'spoon' drains in the east of the site to collect and remove excess surface water (*Image 12*) (*Appendix C - Site Plan*).

Image 9: *The earthen farm irrigation water supply channel along the western boundary and north-western corner of the site will remain after development for the solar farm to convey water to Lot 1.*

Image 10: *One of the fast flow 'Padman' irrigation bay outlets which deliver irrigation water from the farm channel to the irrigation bays*

Image 11: *The earthen farm irrigation water supply channel in the north-western corner of the site looking east along the northern boundary of the site with an irrigation bay outlet in the foreground, an irrigation channel 'check' at the end of the farm channel and scattered remnant trees in the north of the site in the background.*

Image 12: *At the east (lower) end of the irrigation bays is a shallow, trafficable, earthen 'spoon' drain which collects and removes excess surface water.*

4.4 Current Irrigation Services on The Site

It is currently considered that the site is not serviced by irrigation water supply because, as detailed earlier, the On Farm Efficiency Program project did not retain an irrigation water outlet for each allotment and instead allocated metered outlet MV6071 to both allotments simultaneously. The Landholder has retained this metered outlet for Lot 1 along with the delivery share described by GMW; '*There is delivery share of 1.690 ml/day and a Water-use Licence of 329.2 ml for service ID: 8004914 relating to lots 1 & 2 on PS613623U*.' Because the site does not have a dedicated irrigation water metered outlet and the owners do not intend to irrigate the site, it is considered that the site is not currently serviced by an irrigation water supply. The current or future owners of the site may wish to irrigate and where this is the case, the current owners acknowledge they will need to apply to GMW for access to an irrigation water supply and, providing this application is successful (typically based on irrigation water supply channel capacity), pay for any associated metered outlet that may be required. The owners of the site will not be contributing to any costs associated with accessing an irrigation water supply in the interim. Whilst the site is not currently serviced by an irrigation water supply, the site remains in the GMID and could be irrigated in the future.

4.5 Current Irrigation Services on Lot 1

Lot 1 is currently serviced by metered outlet MV6071 which is located adjacent to the 6/6 GMW irrigation channel (*Image 13*). Irrigation water from this metered outlet is initially conveyed through a private irrigation water supply pipeline (500m long; 500 mm diameter) located on a water supply easement on the property to the west of the site. This pipeline discharges into a farm irrigation water channel located on a water access easement on the site and parallel to the western boundary of the site (*Image 14*). This water access easement is the one referred to earlier which was created by the Landholder in 2020. This water access easement encompasses a farm irrigation water channel which conveys irrigation water from the pipeline discharge point, north along the western boundary of the site, east along the northern boundary of the site (south of the existing drainage easement referred to earlier in the report) (*Appendix D - Title Plan*) and which then facilitates discharge of the water from the northeast corner of the site and into the sump located in the adjoining Lot 1 (which is located east of the site) (*Image 15*). The delivery of irrigation water through metered outlet MV6071 is now dedicated to Lot 1, along with the delivery share described by GMW; '*There is delivery share of 1.690 ml/day and a Water-use Licence of 329.2 ml for service ID: 8004914 relating to lots 1 & 2 on PS613623U*.'

Image 13: *Lot 1 is currently serviced by metered outlet MV6071 which is located adjacent to the 6/6 GMW irrigation channel approximately 500 metres west of the site.*

Image 14: *Irrigation water is conveyed through a private irrigation water supply pipeline (500m long; 500 mm diameter) from the 6/6 Channel which discharges into a farm irrigation water channel located on a water access easement in the west of the site.*

Image 15: *Irrigation water is conveyed in an earthen farm channel and an earthen farm drain located in a water access easement along the northern boundary of the site, and is then discharged from the northeast corner of the site into a sump located in the adjoining Lot 1.*

4.6 Irrigation Utility on the Site

The site is developed for gravity, border check (flood) irrigation and the majority of infrastructure associated with this will remain intact when the site is developed as a solar farm by Green Gold Energy. The irrigation water supply channel along the western (*Image 9*) and northern boundaries (*Image 11*) of the site will be retained as this will be utilised to convey irrigation water to Lot 1. The shallow, trafficable, earthen 'spoon' drains in the east of the site will be retained to facilitate removal of excess surface water (*Image 12*). The laser graded, planar, sloping surface, which facilitates the even application of flood irrigation water, will be retained (*Image 7*). The majority of the small earthen check banks will also be retained. Should the site owner wish to irrigate the site in the future, a significant proportion of the irrigation infrastructure installed as part of Round 1 of the On Farm Efficiency Program in 2010 to 2012 could still be utilised to irrigate the site. As detailed above, because the site is not currently serviced by an irrigation water supply metered outlet, an application will need to be made to GMW for irrigation water supply (typically assessed based on irrigation water supply channel capacity) and payment made for any associated metered outlet that may be required.

5 SOLAR FARM IMPACTS ON AGRICULTURE & IRRIGATION

5.1 Land Use Change Economics

The site is currently used for dryland pasture and fodder production, and occasional grazing. By comparison with alternative potential land uses, this current land use generates a low return on investment and a low economic input into the local community. Based on the agricultural utility of the site (detailed above), the site is not likely to realise a substantial increase in agricultural productivity and therefore financial return. Whilst a change in land use to the proposed solar farm is likely to have a similar impact in terms of economic input into the local community over the long-term, the construction phase will have a significant economic input into the local community and the ongoing return on investment is likely to be higher than current.

The change in land use from agriculture to solar farm is likely to increase site economics, increase the long-term security of the site (income security) and diversify (and therefore decrease risk) the district economics as a solar farm income is likely to be more secure by comparison with agriculture as the latter is subject to the vagaries of water supply, labour availability, climate and agricultural commodity prices.

5.2 Land Use Segregation

The proposed development of the solar farm on the site will not segregate surrounding land in relation to access, drainage or irrigation (*Appendix B - District Plan*). The site has its own dedicated access as do all adjoining allotments. As detailed earlier, the site consists of two drainage easements which facilitate excess surface water drainage for allotments to the east and north (*Appendix D - Title Plan*). Development of the solar farm will not impede access to the adjoining community surface water drainage system by the site or by surrounding allotments. All surrounding allotments have their own dedicated access to surface irrigation water.

As detailed earlier, Lot 1 to the east of the site will utilise existing water access easements to convey surface irrigation water from the 6/6 GMW irrigation water supply channel through metered outlet MV6071. As detailed in the Appendices (*Appendix E - Pertinent Site History*), the Landholder was forced to undertake the option of accessing surface irrigation water for Lot 1 from metered outlet MV6071 because the On Farm Efficiency Program project only provided one outlet for two allotments. In addition, in approximately 2010 the Landholder was told that water access to the east (which originally serviced the outlet in the north-east corner of the Landholders property (Lot 1)) was to be disbanded and not replaced. However, GMW irrigation channels to the east of Hendy's Road were decommissioned and replaced with a pipeline 2019. This was contrary to what the Landholder was told in 2010 when the Landholder was informed that he could not have an outlet to replace his existing Large Metered Outlet

in the northeast of Lot 1 as the channels servicing this outlet were to be decommissioned, removed and were not to be replaced. In approximately 2018 the Landholder was informed that he could get an additional outlet to service the eastern end of his property (Lot 1) (sourced from the new proposed pipeline) but that this would cost approximately $50,000. In 2020, the Landholder was therefore forced to access surface irrigation water for Lot 1 from metered outlet MV6071 as all infrastructure was already in place (funded by the On Farm Efficiency Program) to facilitate this and all that was required was a water access easement on the site.

5.3 Irrigation Water Supply

The removal of access to surface irrigation water through metered outlet MV6071 and the cessation of irrigation on the site will not adversely impact the GMW supply of irrigation water to allotments adjoining the site or in the surrounding district. Surrounding allotments have their own dedicated surface irrigation water supply metered outlets. Metered outlet MV6071, now dedicated to Lot 1, will remain operative and the irrigation water supply services associated with this, described by GMW as '*There is delivery share of 1.690 ml/day and a Water-use Licence of 329.2 ml for service ID: 8004914*', will be dedicated to Lot 1. An irrigation water delivery share and Water-use Licence of these magnitudes is not unusual for an allotment of 36.03 ha. This water use licence equates to 9.1 ML/ha/annum which is not an unusual hydraulic loading for perennial pasture species in this climate.

Because the water supply services associated with metered outlet MV6071 and Service ID: 8004914 have not changed, there will be no adverse impact on irrigation water supply and demand on the 6/6 GMW irrigation water supply channel. The same ongoing static irrigation water supply charges will apply to this service and the owner of Lot 1 will continue to pay these.

It could be argued that the cessation of irrigation on the 21.68 ha site could render remaining district infrastructure encumbered with additional operational charges. However, it needs to be noted that the site is only suitable for the application of between 1.0 and 3.0 ML per hectare of irrigation water in an irrigation season depending on climatic variables due to its suitability for annual pastures or crops only. This equates to 60 ML of water per year at most.

Based on information provided by GMW (Pre-planning permit reference: PPP-20-00016); '*There are 18 downstream customers (serviced from 32 outlets) on the 6/6 channel, including the Numurkah Town Offtake*'. None of these customers will be adversely impacted by recent or proposed changes to metered outlet MV6071 and Service ID: 8004914. Whilst the irrigation water delivery share and Water-use License details of these customers were not made available, a conservative estimate places the above-mentioned 60 ML at approximately 1% of the downstream customers usage. Annual variations in irrigation water usage on this system of this magnitude would occur from year to year due to a range of

factors (variable production, climate etc.) and are not likely to adversely impact GMW or GMW irrigation water customers in the district.

5.4 Reduction in Irrigated Agricultural Land

As detailed previously, production and returns from the 21.68 ha site are not high and are not likely to see significant agricultural productivity increases in the foreseeable future due to scale, flooding, soil type, location and the lack of agricultural infrastructure. The site is in the Central Goulburn Irrigation District which comprise approximately 250,000 ha. This Irrigation District uses approximately 400,000 ML of surface irrigation water per annum on approximately 100,000 ha leaving 150,000 ha of un-irrigated 'dryland' which mostly has access to the irrigation water supply system. Through irrigation water and irrigation system rationalisation, over recent years the volume of irrigation water available in this district has reduced substantially and this has resulted in an increase in the area of previously irrigated land which is now not currently irrigated. A large proportion of this 'dryland' with access to irrigation water consists of soils suitable for high-value agriculture. It is water and not land that is currently limiting production in the region and it is likely that this will continue to be the case into the future in this district, in the Goulburn Murray Irrigation District (GMID) and in the wider southern Murray Darling Basin. There is a significant area of available land with access to irrigation water which could be utilised for irrigated agricultural production but is not currently utilised due to a lack of irrigation water. Where the land use on the site changes from irrigated agriculture to a solar farm, irrigation water previously used on this land could readily be utilised on other land; land on Lot 1, in the Central Goulburn Irrigation District or in the wider southern Murray Darling Basin. Agricultural production from the site could readily be achieved on other areas of available 'dryland' in the district which has access to irrigation water and which is not currently irrigated. Therefore, the actual loss to the district of agricultural production on the site from the proposed solar farm installation is not current production levels or the potential irrigated agricultural production levels, rather, it is the loss of the equivalent value of dryland production. The loss of agricultural production is therefore considered to be equivalent to 21.68 ha of dryland production. Whether considered on an area (yield/ha) or a financial ($/ha) basis, this loss in agricultural production is small (< 0.003 %) when considered across the Central Goulburn Irrigation District, and is even smaller when considered across the wider southern Murray Darling Basin. It is therefore concluded that the loss in agricultural production is not significant and is not likely to impact the economy of the district.

6 CONCLUSIONS

This comprehensive Agricultural Assessment of the site considered existing and historical irrigation and drainage infrastructure (both on-site and adjoining; both private and GMW), historical irrigation water use, soil physical and chemical characteristics, site current and historical agricultural management, and agricultural, environmental and physical features on and adjoining the site. This facilitated an assessment of the agricultural utility of the site, historical and current irrigation utility of the site, and an assessment of the potential impacts to agriculture and irrigation on the site, in the district and in the wider Murray Darling Basin.

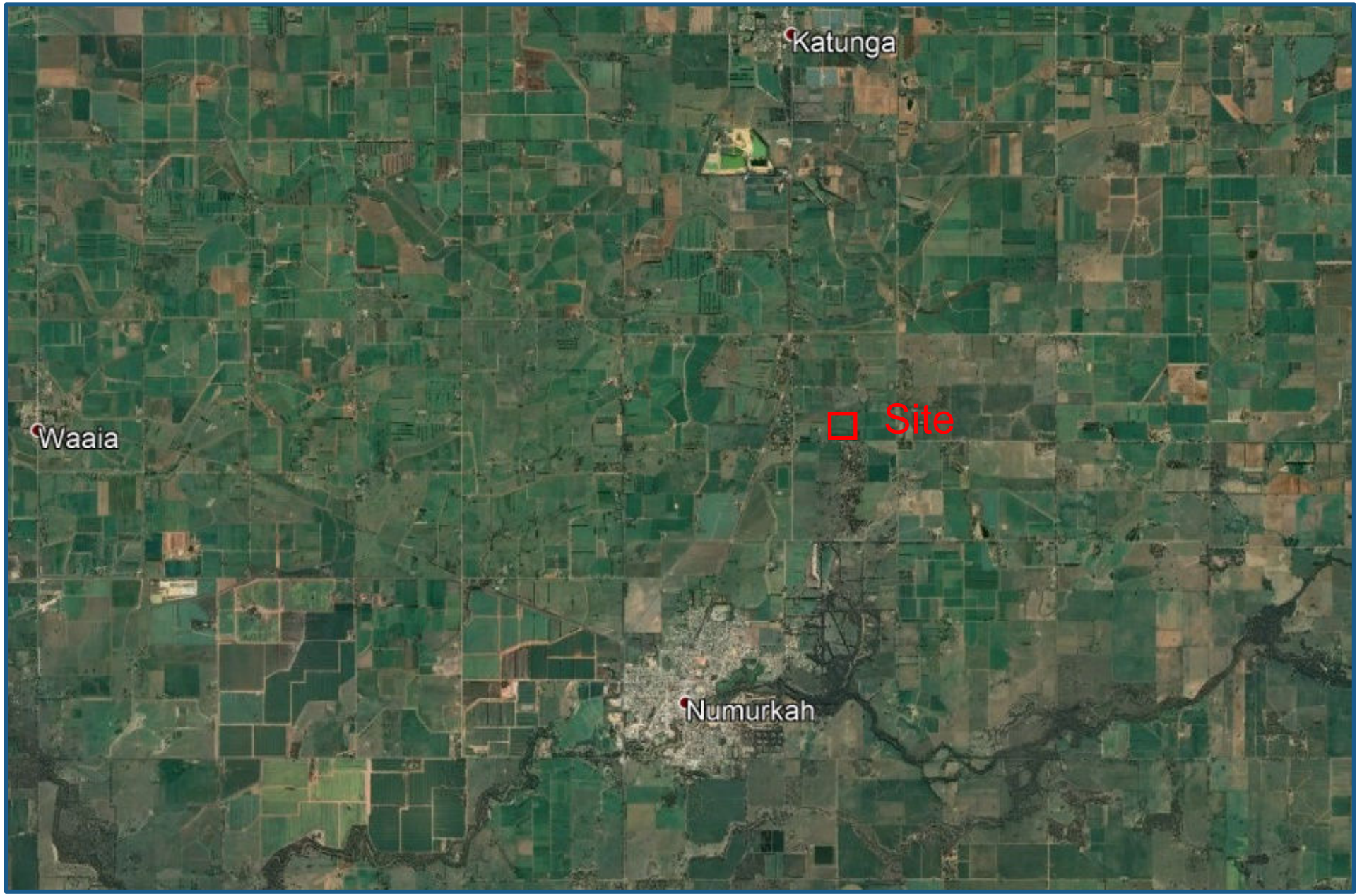
The site does not consist of highly productive agricultural land and is typical of average, mediocre, agricultural land throughout the GMID. As a result, the site has historically been used for annual pasture and fodder crop production and not for higher value perennial pasture or perennial crop production. Historically, when the site, in conjunction with Lot 1, was owned by the Landholder (ownership spanning the past approximately 18 years), investment in irrigation infrastructure, irrigation water use and farm production was focused on Lot 1 rather than on the site. The Landholder indicated that less than 10% of the On Farm Efficiency Program project funds were utilised on the site as most were invested in the supply pipeline and on Lot 1. Historical water use through metered outlet MV6071, and the associated production and land use on the site and Lot 1, were not unusual and correlated with the milking herd number fluctuations, farm commodity prices, climatic variables, irrigation water price/availability and dairy milk market volatility.

While the site is currently not serviced by surface irrigation water supply, development of the site for a solar farm will see the majority of existing On Farm Efficiency Program funded irrigation infrastructure retained. The site could still be irrigated in the future providing a successful application to GMW for irrigation water supply and the payment and installation of a metered outlet.

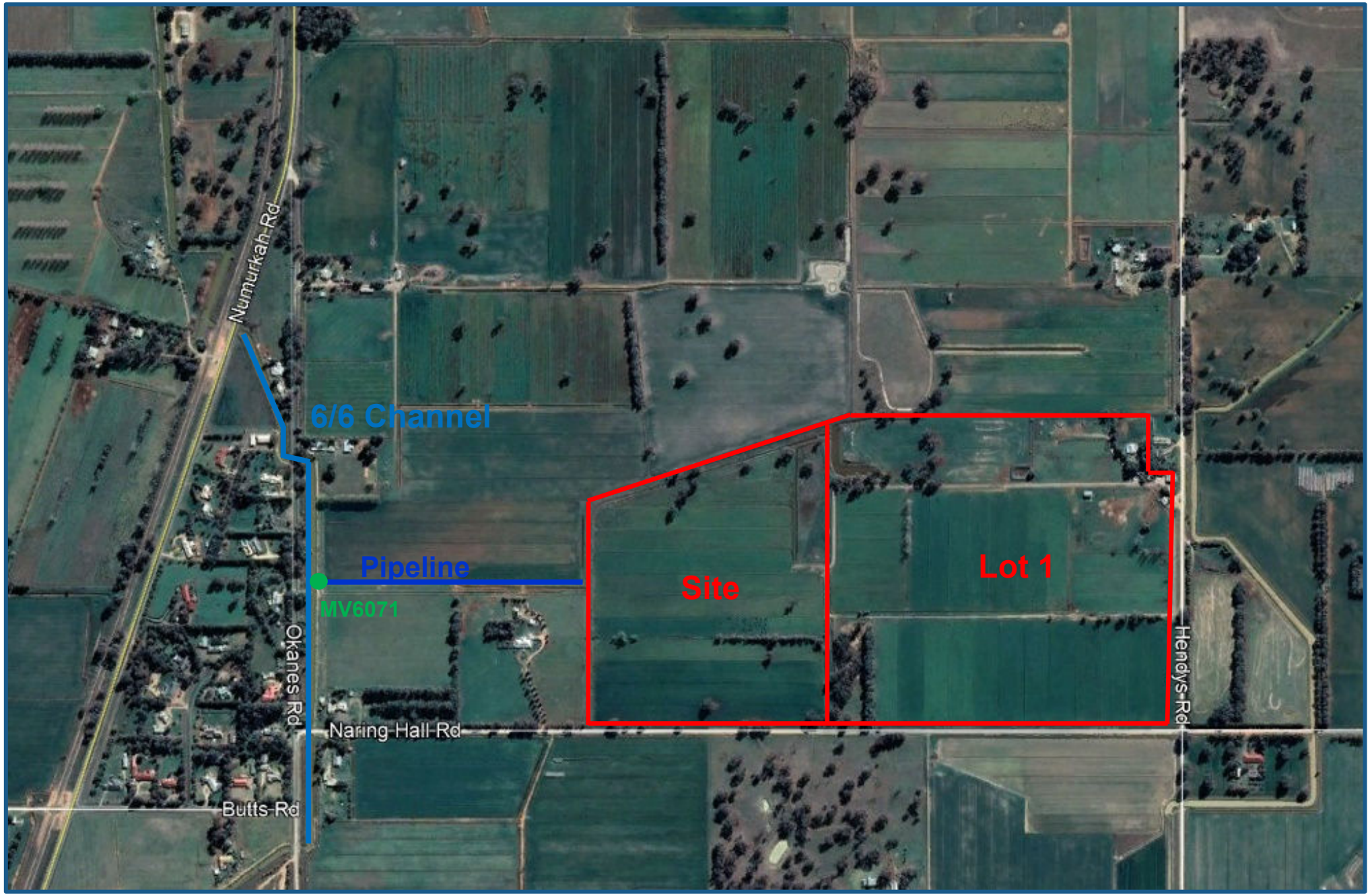
The assessments herein indicate that, through site development, no adverse impacts are likely from the change in land use from agriculture to a solar farm including impacts to land use change economics, land use change segregation, district irrigation water supply and the reduction in irrigated land in the district, the GMID or the Murray Darling Basin. It is concluded that converting the site from either historical irrigated agriculture, the current dryland agriculture, or potential future irrigated or non-irrigated agriculture, to the proposed solar farm will not significantly compromise On Farm Efficiency Program investments, nor will it adversely impact district irrigation infrastructure or practices and/or irrigated agriculture (either locally, in the GMID or in the Murray Darling Basin).

7 APPENDICES

7.1 Appendix A - Locality Plan

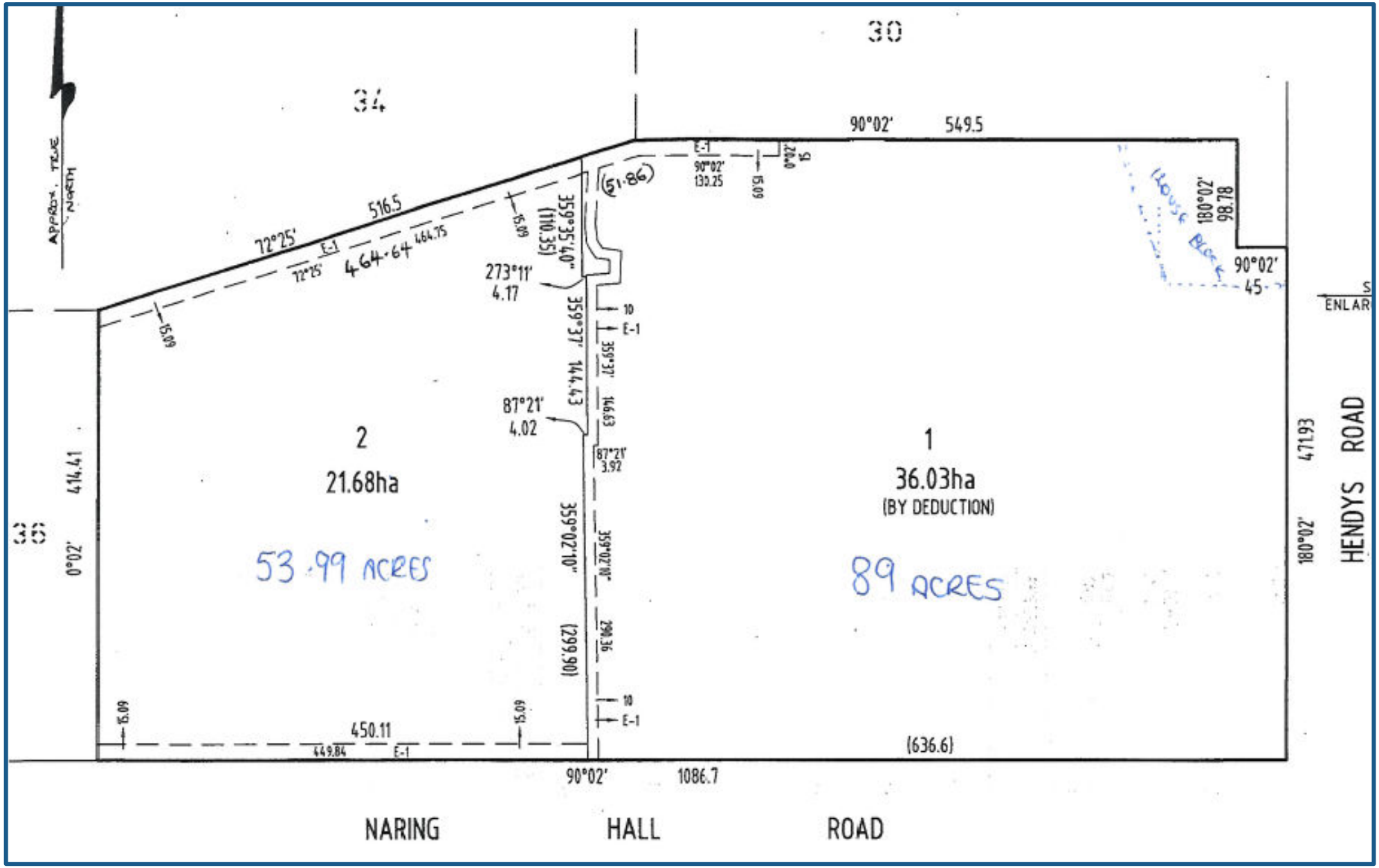


7.2 Appendix B - District Plan



7.3 Appendix C - Site Plan

7.4 Appendix D – Title Plan



7.5 Appendix E - Pertinent Site History

Pertinent historical events relating to the site and to Lot 1, based on information provided by the Landholder (verbally) and provided by GMW (Pre-planning permit reference: PPP-20-00016), are provided in *Table E1*. Relevant historical events relating to water entitlement and water use are included and these are based on information provided by GMW (Pre-planning permit reference: PPP-20-00016) and by the Landholder.

Table E1; *Historical events relating to the site, Lot 1, water entitlement and water use.*

Date[1]	Event	Water Entitlement[2]	Water Use[3]
2002	Lot 1 & the site purchased by Landholder as one allotment	169 ML	-
2007	The site (Lot 2) subdivided from Lot 1 (*Appendix D - Title Plan*)	169 ML	-
2007	Unbundling of water rights	169 ML	-
2009	Dairying with low herd numbers & supplementary feeding	169 ML	8 ML
2010	Dairying, supplementary feeding & increasing herd numbers	169 ML	20 ML
2011	Dairying, supplementary feeding & increasing herd numbers	169 ML	23 ML
2012	Dairying with higher herd numbers & no supplementary feeding	100 ML	261 ML
2010-2012	Landholder participates in the On-Farm Efficiency Program	100 ML	-
2013	Dairying & producing most feed on farm	100 ML	393 ML
2014	Dairying & producing most feed on farm	100 ML	375 ML
2015	Dairying & producing most feed on farm	100 ML	414 ML
2016	Dairying & producing most feed on farm	100 ML	355 ML
2017	Dairying & producing most feed on farm	100 ML	279 ML
2018	Dairying, then disperse herd & sell water entitlement	100 ML	345 ML
2019	Modernisation sees channels to the east of Lot 1 piped	0 ML	83 ML
2020	Create easement across the site to supply water to Lot 1	0 ML	0 ML

[1] approximate dates only

[2] water entitlement attached to Lot 1 (pre 2007) and then owned by the Landholder (post 2007)

[3] water use (on the Site & on Lot 1) reported by GMW; assumed to be for a calendar year (covering 2 half irrigation seasons)

As detailed in *Table E1*, the Landholder purchased the site and Lot 1 as one allotment in approximately 2002. Because irrigation water entitlement was connected to land in 2002, the purchase of this allotment included the purchase of a 169 Megalitre (ML) water entitlement (also referred to as Permanent Water and/or High Reliability Water). Prior to the Moira Shire introducing new rules on subdivision of rural land in 2007, the Landholder took the opportunity to subdivide his 57.71 ha farm into two allotments. This resulted in the formation of Lot 1 (36.03 ha) and the site (Lot 2) (21.68 ha).

In 2007 irrigation water entitlement was disconnected (or 'unbundled') from land. After this occurred, the property had an irrigation water delivery share and could access irrigation water however, no irrigation water entitlement was associated with either the site or with Lot 1. Thereafter, the Landholder was the owner of the 169 ML water entitlement. Based on information supplied by Goulburn Murray Water (GMW) (as detailed in Pre-planning permit reference: PPP-20-00016); '*There is delivery share of 1.690 ml/day and a Water-use Licence of 329.2 ml for service ID: 8004914 relating to lots 1 & 2 on PS613623U. Meter outlet MV6071 has a flow rate of 12.00 ML/day.*' This indicates that the right to access irrigation water under these conditions is simultaneously attributed to both the site and to Lot 1.

Between 2002 and 2010 the Landholder had the ability to access irrigation water through a Large Metered Outlet (large Dethridge Wheel) located near the north-east corner of Lot 1 and through a Small Metered Outlet (small Dethridge

Wheel) located along the central western boundary of the site. When the property was one allotment, two irrigation water outlets were required to facilitate gravity fed irrigation due to the natural topography of the land which has a natural depression running north-south dissect the property into two proportions; the eastern proportion and the western proportion. The eastern proportion was the larger proportion of the property and this required a large irrigation water outlet which, as detailed above, was located near the north-east corner of property. The western proportion was the smaller proportion of the property and this therefore required a small irrigation water outlet which, as detailed above, was located along the western boundary of the property. Water was delivered to both of these irrigation outlets through water authority 'spur' channels. These spur channels can be discerned on the 1942 Soil Map provided as *Appendix G - Soil Map*.

Over 2010 to 2012 the Landholder participated in Round 1 of the On Farm Efficiency Program, which was an early stage of the Goulburn Murray Water Connections Project (formerly the Northern Victoria Irrigation Renewal Project (NVIRP)). In 2010 the Landholder owned two adjoining allotments (the site and Lot 1) with each allotment serviced by its own metered irrigation water outlet. In preparation for the On Farm Efficiency Program the Landholder was told that he could only be offered one outlet for both allotments because the channel(s) servicing the Large Metered Outlet in the north east of Lot 1 were to be decommissioned, removed and were not to be replaced. The Landholder requested two outlets to replace his two existing outlets but was told that this was not possible. Therefore, the only option given to the Landholder was to access irrigation water from the central western boundary of the site where the Small Metered Outlet was located. As part of this modernisation project, the Landholder was responsible for the installation of approximately 500 metres of 500 mm diameter pipe to convey water from the larger 6/6 GMW irrigation channel to the central western boundary of the site, which replaced the original GMW spur channel conveying irrigation water to the site.

Part of this modernisation project included improvement of the existing gravity border check (flood) irrigation system on the site. This included installation of a farm irrigation water supply channel, fast flow 'Padman' irrigation bay outlets and earthworks associated with land forming (laser grading) of the land to facilitate border check (flood) irrigation. Because irrigation water could only be accessed from the western boundary of the site, gravity delivery of irrigation water from a GMW asset to Lot 1 (which covered the larger proportion of the Landholder's property) was not possible. Therefore, the Landholder was required to convey irrigation water from the western boundary of the site, through the site, to a surface drainage water collection sump in a low lying area in the northwest of Lot 1 (referred to herein as '*the sump*'). Whilst the natural topography of the land facilitated conveyance of this irrigation water across the site by gravity, irrigation water from the sump then had to be lifted by a pump to facilitate irrigation of Lot 1. The Landholder wanted to irrigate Lot 1 by gravity from a GMW asset but was told this was not possible and the only way to facilitate irrigation of Lot 1 was by pump which was the responsibility of the Landholder. To facilitate irrigation of Lot 1, the Landholder was forced to enlarge the sump, install a pump suction pit, install a diesel pump and install a pipe and riser irrigation water delivery system across the majority of Lot 1. The Landholder then incurred the additional costs of pumping this irrigation water to irrigate Lot 1. This modernisation project also included construction of a farm irrigation water supply channel and fast flow 'Padman' irrigation bay outlets on a small section of Lot 1. The modernisation project also included earthworks associated with land forming (laser grading) of the land to facilitate border check (flood) irrigation on Lot 1.

The modernisation project also included earthworks to facilitate drainage, and to manage and convey excess surface water from both the site and Lot 1 to the aforementioned sump.

The majority of the funds received by the Landholder as part of the Round 1 On Farm Efficiency Program were spent on the pipeline conveying irrigation water from the 6/6 channel to the property boundary and on Lot 1. Less than 10% of these funds were spent on the site as the majority of the site was already laid out for border check (flood) irrigation and the existing system was upgraded with an enhanced channel, new outlets and minor land forming earthworks. The majority of the on-farm irrigation infrastructure was installed on Lot 1 where the sump was enlarged, pumping infrastructure was established, the pipe and riser irrigation delivery system was installed and considerable land forming earthworks were undertaken to reconfigure the existing small antiquated irrigation bays into larger irrigation bays. Whilst the water savings from the On Farm Efficiency Program were calculated across all of the Landholders two allotments (the site and Lot 1), the majority of these water savings were realised from Lot 1 as this is where the majority of the better soils occur across the Landholder's property. It was considered more viable to invest the majority of funds on Lot 1 as this allotment consists of a higher proportion of better soils and was closer to the agricultural infrastructure. As detailed in *Table E2*, 55% of the site consists of soils considered suitable for commercial irrigated agriculture whilst 85% of Lot 1 consists of soils considered suitable for commercial irrigated agriculture. The suitability of the various soil types for commercial irrigated agriculture is based on determinations from the 1942 Soil Map publication by Butler *et al.* (1942) (refer to *Appendix G*).

Table E2; *Proportions of soil types, Soil Classes, and soil suitability on the site and Lot 1; refer to appendices (Appendix F - Soil Classes and Soil Suitability for Crops; Appendix G - Soil Map).*

The Site				
Map Legend	**Soil Class**	**Soil Type**	**Coverage**	**Irrigation Suitability**
	II	*Csl & Cl*	25%	Suitable
	III	*Nl*	30%	Suitable
	VI	*Bl & Mcl*	45%	Not Suitable
55% Suitable; 45% Not Suitable for commercial irrigated agriculture				
Lot 1				
Map Legend	**Soil Class**	**Soil Type**	**Coverage**	**Irrigation Suitability**
	II	*Csl & Cl*	50%	Suitable
	III	*Nl*	35%	Suitable
	VI	*Bl & Mcl*	15%	Not Suitable
85% Suitable; 15% Not Suitable for commercial irrigated agriculture				

In 2019, the GMW irrigation channels to the east of Hendy's Road, which originally serviced the outlet in the north-east corner of the Landholders property (Lot 1), were decommissioned and replaced with a pipeline. This was contrary to what the Landholder was told in 2010 when the Landholder was informed that he could not have an outlet to replace his existing Large Metered Outlet in the northeast of Lot 1 as the channels servicing this outlet were to be decommissioned, removed and were not to be replaced. In approximately 2017 the Landholder entered into discussions with the Connections Project to assess the feasibility of this new pipeline route going through parts of the Landholder's Property. At this time the Landholder queried whether he could get an additional outlet to service the eastern end of his property and was told that he could however, this would cost approximately $50,000. The proposed compensation for utilising the Landholder's property for the pipeline route was $4,000. Based on financial

considerations, the Landholder considered these options (the pipeline route through his property and the new outlet) as unviable. In addition, the Round 1 On Farm Efficiency Program works had long since been completed facilitating irrigation of Lot 1, albeit with the additional pumping costs involved for irrigation.

As detailed earlier, in 2007, the Landholder was the owner of 169 ML of high reliability water entitlement. In 2012, as part of the Round 1 On Farm Efficiency Program, the Landholder sold (relinquished) 69 ML of this irrigation water entitlement leaving 100 ML of high reliability water entitlement. The Landholder sold his remaining 100 ML of high reliability water entitlement in 2018. The combination of reducing milk prices, increasing water prices, increasing farm input costs, and deteriorating health forced the Landholder to cease intensive agricultural production in 2018, sell his remaining water entitlement and disperse his dairy herd.

The Landholder sustained a milking herd of cattle for the majority of the time between 2002 and 2018 however, during the Millennium Drought (2002 to 2009) the Landholder was forced to sell off a large proportion of the herd, supplementary feed the herd and therefore use substantially less irrigation water. It then took several years for the Landholder to gradually build up his milking herd again and this occurred between 2009 and 2011. Irrigation water usage was therefore low prior to 2012 and increased substantially after this once the larger herd was established and began production. As detailed in *Table E1*, for a period of approximately 7 years, from 2012 to 2018, the Landholder accessed (from GMW) and utilised between 262 and 414 ML per year. The amount of irrigation water utilised varied from year to year depending on climatic variables, plant water requirements and agricultural production levels. The majority of this irrigation water was utilised on Lot 1 as this allotment consists of a higher proportion of better soils, is closer to the agricultural infrastructure, had an easier to operate pipe and riser irrigation delivery system and was utilised for longer term, higher productivity agricultural pasture species by comparison with the site. Lot 1 was utilised to grow to lucerne and perennial pasture for the majority of this period, plant species which typically require between 7.0 and 10.0 ML per hectare of irrigation water in an irrigation season, depending on climatic variables. The site was used for annual winter pastures which typically access the majority of required plant water from rainfall and which typically require between 1.0 and 3.0 ML per hectare of irrigation water in an irrigation season, depending on climatic variables. In approximately 3 of these years, 10 to 20% of water accessed from GMW was applied to the site with the remainder applied to Lot 1. Since the modernisation project was implemented, the Landholder has utilised only approximately 10% of water accessed from GMW on the site with the remainder applied to Lot 1.

The Landholder utilised very little water when temporary water prices were very high in 2008 to 2009 ($170 to $550 / ML), utilised very little water during the Round 1 On Farm Efficiency Program due to the associated irrigation system disruptions, significantly increased irrigation water use from 2012 to 2018 when temporary water prices were low in 2012 to 2015 ($15 to $150 / ML), and when temporary water prices were moderate in 2015 to 2018 ($80 to $300 / ML), and significantly reduced irrigation when temporary water prices were very high in 2018 to 2020 ($300 to $600 / ML).

This pattern of water use and land utilisation over this period was not unusual and correlated with farm commodity prices, climatic variables, irrigation water price/availability and dairy milk market volatility. This history of water use, land use and infrastructure investment across both allotments shows the majority of irrigation water utilisation, investment and farm production focused on Lot 1 rather than on the site.

Because of the absence of dedicated irrigation water supply for Lot 1 following implementation of the On Farm Efficiency Program, in 2020 the Landholder formed a water access easement to enable irrigation water to be conveyed from the western boundary of the site, around the northern boundary of the site, to the sump in Lot 1. This now facilitates irrigation water access for Lot 1, independent of the site.

7.6 Appendix F - Soil Classes & Soil Suitability for Crops

All of Australia's agricultural soils can be classified for production potential, into six classes. The emphasis in this classification is on the depth of surface soil, its texture, permeability to water, stability and drainage status; and on the subsoil's permeability, drainage and softness for root growth.

Class I	Excellent productivity for all agriculture.
Class II	Very good for most agriculture.
Class III	Good for a range of agriculture.
Class IV	Fair for a limited range of agriculture.
Class V	Low yields; pastures and some crops only.
Class VI	Unsuitable for agriculture.

Some of the crops that can be grown in each of the six classes are;

Class I All fruits, vines, nuts, vegetables, tomatoes, lucerne, olives, row crops, fodder crops, field crops, pastures and forest trees.

Class II All fruits (except citrus, early peaches and cherries), vines, olives, some nuts (e.g. almonds but not Walnuts), most vegetables, tomatoes, lucerne, row crops, fodder crops, field crops, pastures and forest trees.

Class III Apricots, apples, pears, plums, vines, olives, some vegetables, row crops, fodder crops, field crops, pastures and forest trees. Fair soils for tomatoes and lucerne.

Class IV Row crops, fodder crops, field crops, pastures and forest trees. Fair soils for pears, plums and vines.

Class V Fodder crops, field crops, pastures and forest trees; only if well drained.

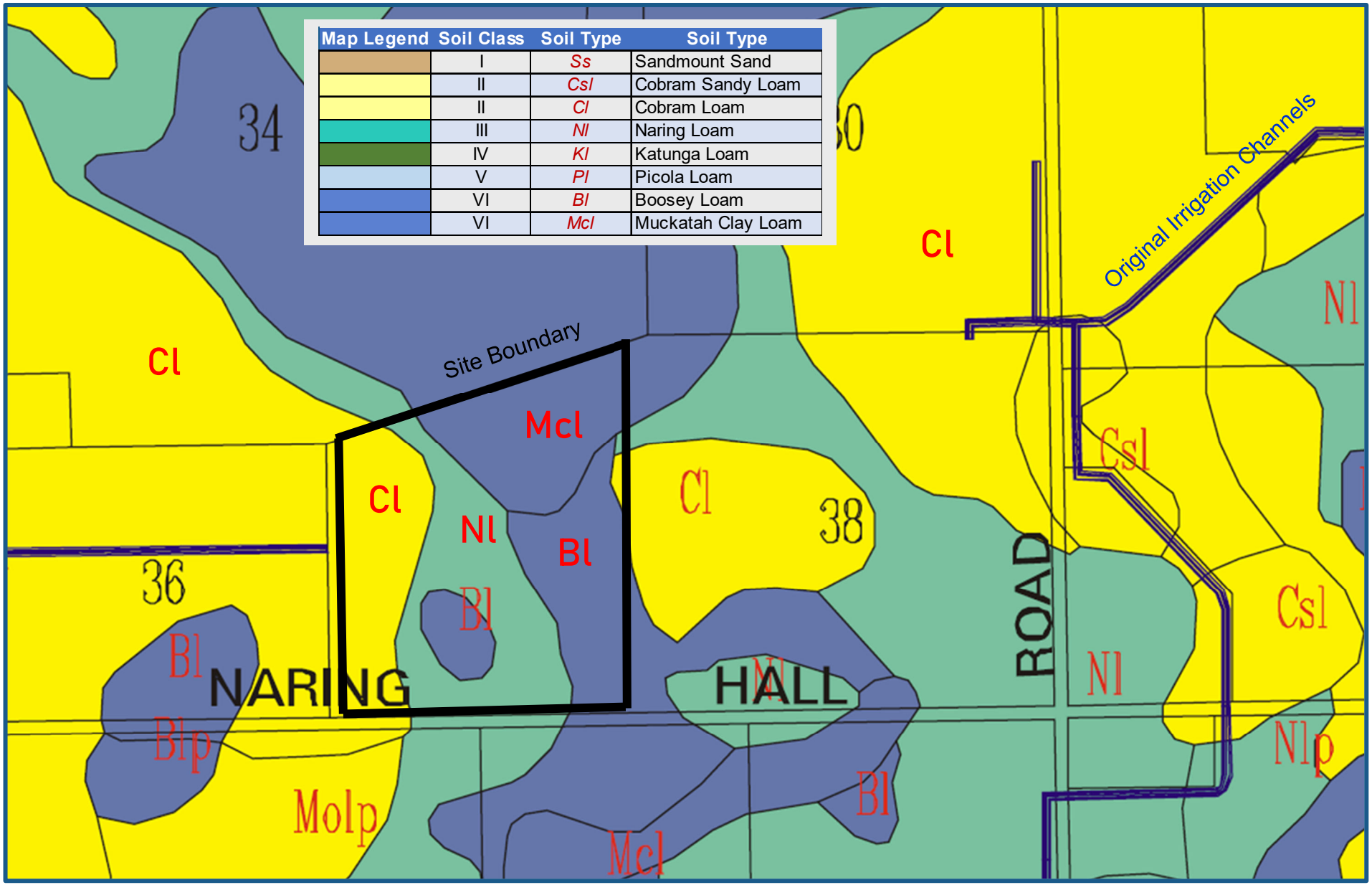
Class VI Unsuitable for agriculture.

The Soil Map provided in *Appendix G* is from:

> **Butler, B.E.; Baldwin, J.G.; Penman, F.; Downes, R.G. (1942)** *Soil Survey of Part of County Moira, Victoria - Including the Parishes of Boosey, Cobram, Katamatite, Naringaningalook, Katunga, Yarroweyah, and Strathmerton.* Bulletin number 152. Council for Scientific and Industrial Research (CSIR), Commonwealth of Australia, Melbourne, Victoria.

This publication uses soil groups similar to the Soil Classes detailed above.

7.7 Appendix G – Soil Map



7.8 Appendix H - Flooding Plan