REPORT

Hay 1A Solar Farm

Water Assessment

Submitted to:

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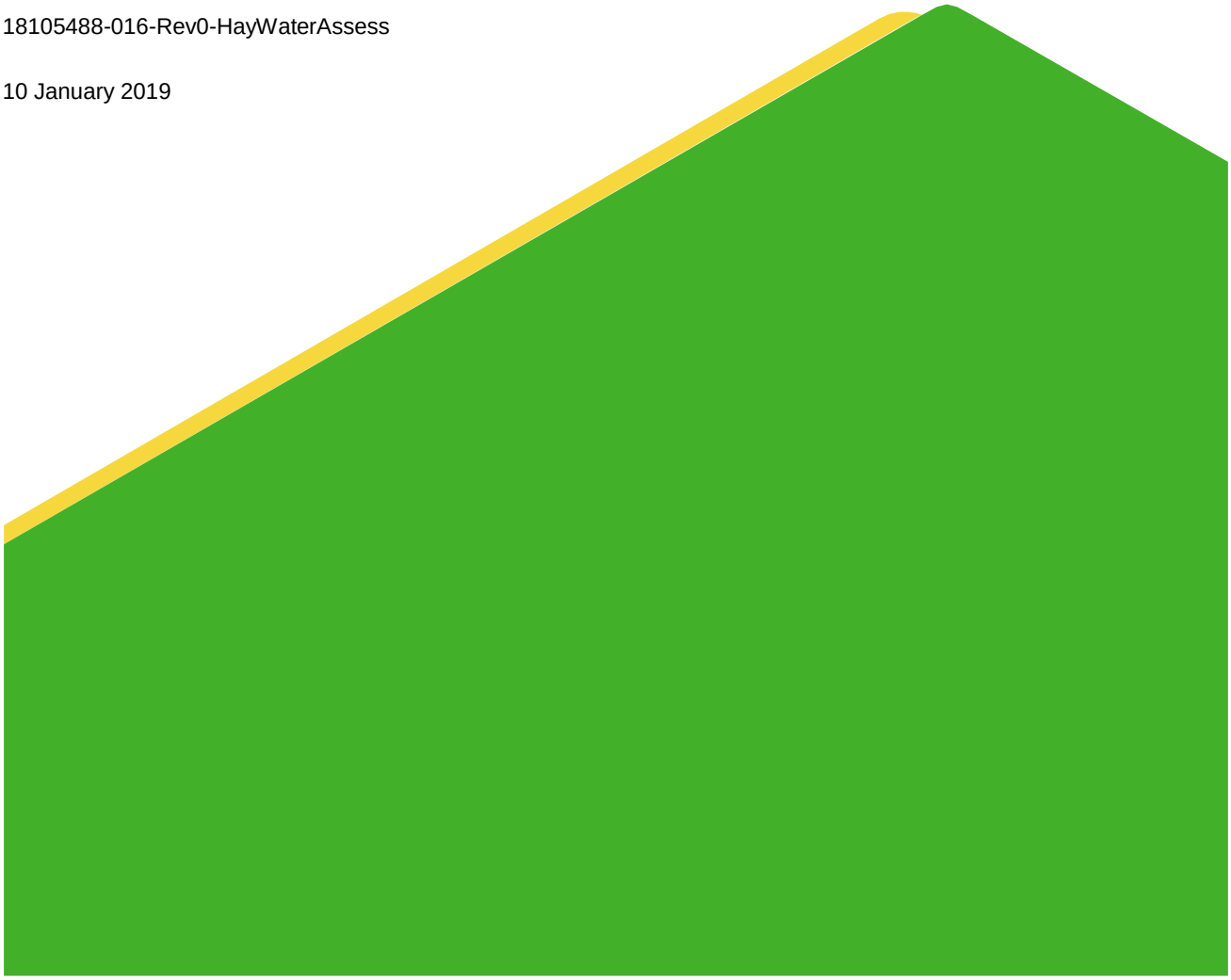
10 January 2019



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1.0 INTRODUCTION

The proposed Hay 1A Solar Farm is located at Lot/DP 110/1187931 on the Mid Western Highway, Hay north east of the Hay township, within the Hay Shire Council area. ITP Renewables (Australia) Pty Ltd (ITP Renewables) proposes to construct a 5 MW solar facility within the site, which is currently used for agriculture.

This report, which provides a desktop flood assessment to support the Development Application for the project, includes a:

- Desktop review of local hydrology and catchment and water quality data.
- Desktop review of surface and groundwater quality data.
- Desktop review of the flood risk potential against the published references, Local Environmental Plan and Land-use Plan.
- Desktop impact assessment against New South Wales (NSW) policies and referenced industry standards for solar arrays.
- Desktop management assessment with mitigation measures recommend for construction and operation.

1.1 Limitations of assessment

The assessment is based on publicly available information and data and does not include any additional hydrological and/or hydraulic modelling.

1.2 Important information relating to this report

Your attention is drawn to the document titled - “Important Information Relating to this Report”, which is included in Appendix “A” of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

2.0 PROJECT DESCRIPTION

The proposed Hay Solar Farm is located on Mid Western Highway in Hay within the Hay Shire Council area. Figure 1 indicates the area of the proposed facility. ITP Renewables propose to construct a solar farm with a DC array capacity of 6.175 MWp and an AC output of 4.99 MW on a site that is currently used for agriculture.

There are to be 19,200 solar modules installed in 188 rows (each row being ~94 m long and ~4 m wide) running north to south. Each row of PV modules will rotate to track the sun across the sky from east to west each day. There is approximately 6 m spacing between each row. The hub height of each tracker is 2 m with the peak of the modules reaching a height of 3.7 m when the array is fully tilted to 60 degrees from horizontal.

The solar farm will also consist of two 2.5 MW inverter stations. These inverters are to be located within the array and are each mounted on a 20 ft skid. Each of these inverter stations incorporate the High/Medium voltage switchgear and transformers.

The mounting system will be constructed on piles that are driven in to the ground. During construction, which is expected to take approximately 3 months, there is likely to be around 50 personnel on site working from 7 am – 4 pm Monday to Friday. Once operational the site will be unmanned with maintenance expected to be carried out quarterly by a crew of 2 – 3 people.

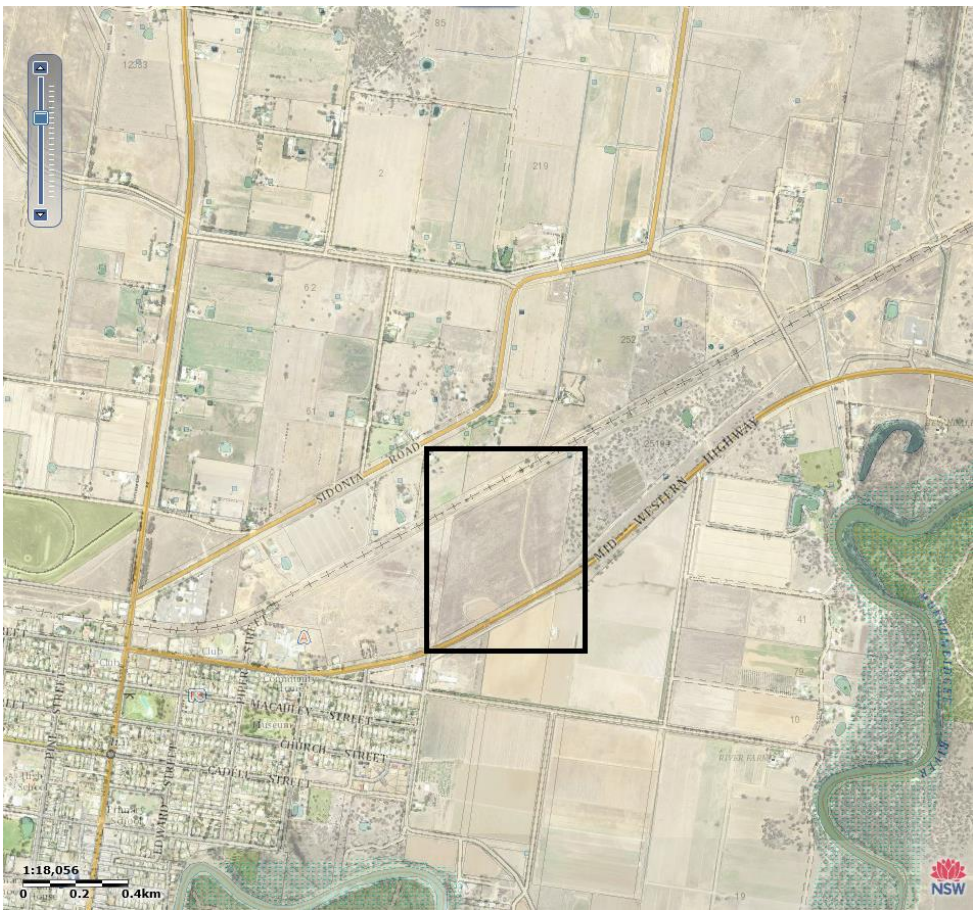

Figure 1: Location of proposed Hay Solar Farm (indicated by black rectangle)[1]

[1] (Spatial Services, 2018)

3.0 CATCHMENT AND FLOOD HISTORY

The site is located north east of Hay within the boundary of the Hay Private Irrigation District (HPID) area and the Murrumbidgee Valley district of the Murrumbidgee regulated river system. In 2016, the HPID was awarded funds under the Australian Government's Private Irrigation Infrastructure Operators Program to upgrade the irrigation delivery system from an open channel to a low pressure pipeline.

Hay township has 2 levees - north and south of the Murrumbidgee River. The Hay town levee, which is approximately 5.7km long and is formed by a combination of embankments, elevated roadways and naturally higher ground, protected Hay township from inundation during the 1956, 1974, 2010 and 2012 flood events. The site of the proposed facility is behind this levee. Even with major inundation of the township due to levee failure or overtopping, the site is considered to be outside of the impacted zone as indicated in Figure 2. The scenario considered in Figure 2 is a "1956 style" event with levee failure or overtopping.

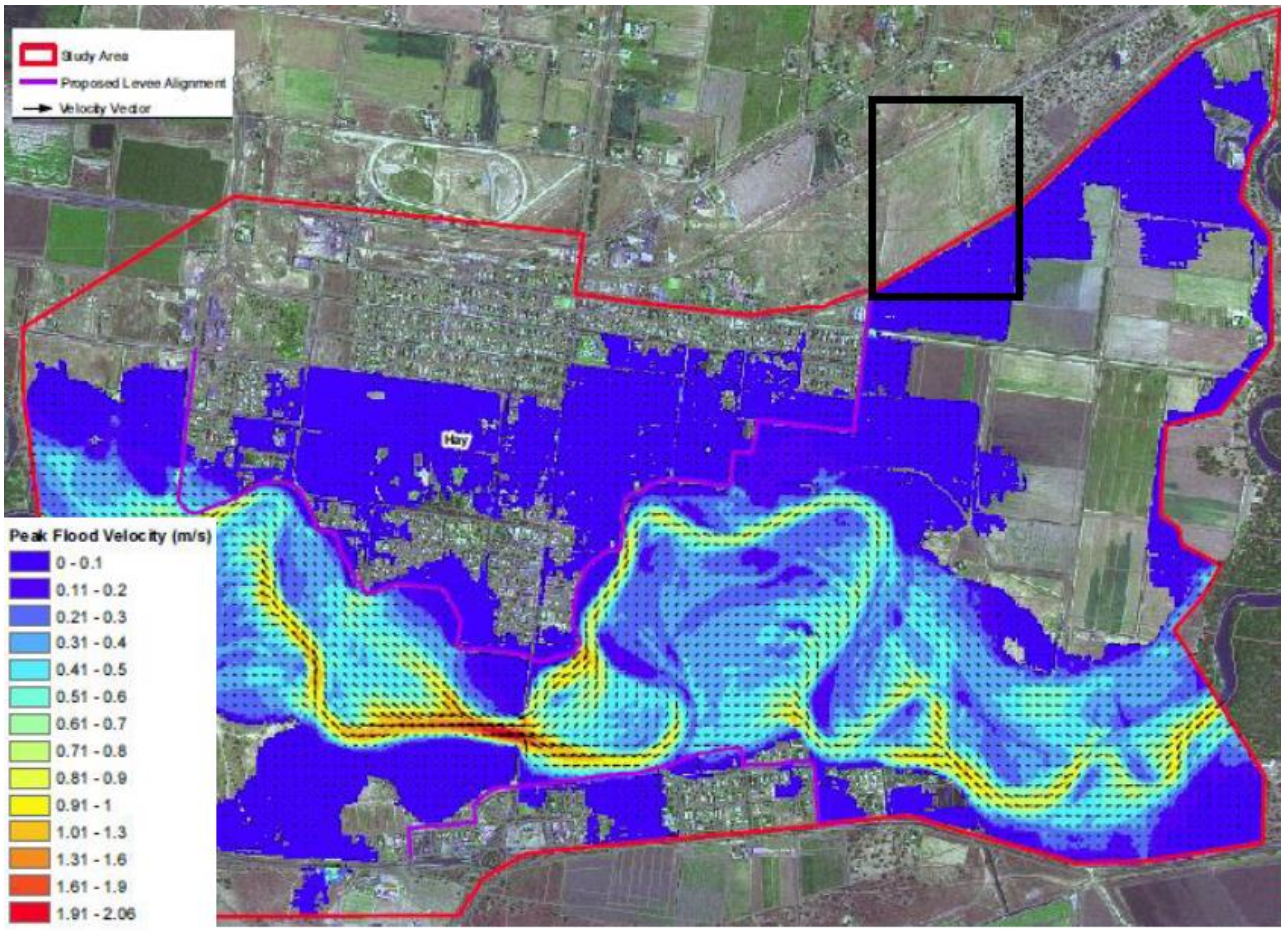

Figure 2: Predicted inundation of Hay in the event of levee failure[2]

[2] Map 5, Hay Local Flood Plan (as amended 10 October 2012), a Sub-Plan of the Hay Shire Local Disaster Plan

4.0 LEGISLATIVE CONTEXT

NSW has a comprehensive legislative and policy framework for the management of floodplain risk and flood prone areas of the state with clear areas of responsibility as outlined below in Figure 3.

Figure 3: Floodplain Risk Management and Planning Process

4.1 Local Government Act 1993

This Act provides a legal framework for the NSW system of local government. The Floodplain Management Manual was gazetted in 2005 as the manual relating to the development of flood-liable land for the purposes of section 733. This section exempts councils from liability in relation to flood prone land provided they have undertaken assessments substantially in accordance with the latest manual.

The Floodplain Development Manual (NSW Government, 2005) is the approved Section 733 manual for flood prone land. The manual supports the NSW Government's Flood Prone Land Policy in providing for the development of sustainable strategies for the management of floodplains specifically in relation to human occupation. It provides a framework for councils to implement the policy and a process for managing floodplain risk.

4.2 Water Management Act 2000

The Act provides for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. Water management principles intended to guide decision making under the Act in relation to floodplain management require the existing and future risk to human life and property arising from occupation of the floodplain to be minimised.

4.3 Hay Local Environmental Plan 2011

The Hay Local Environmental Plan 2011 (hereby referred to as the Plan) aims to make local environmental planning provisions for land in Hay in accordance with the relevant standard environmental planning instrument.

The Plan does provide specific management requirements for flood planning which applies to land at or below the flood planning level (1 in 100 ARI plus 0.5m freeboard). It requires that development consent cannot be granted unless the proposed development is compatible with the flood hazard of the land and it will not cause significantly adverse impacts to other developments, the environment and the community.

The Plan provides additional provisions for earthworks to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.

The Plan provides the prohibited and permitted types of development within the local area. Some types of development are also regulated by particular State environmental planning policies.

4.4 State Environmental Planning Policy (Infrastructure) 2007

Division 4 of the State Environmental Planning Policy (Infrastructure) 2007 relates to 'Electricity generating works or solar energy systems'. The policy relates to the approval process for solar energy systems, and there are specific details required for flood liable land which means land that is susceptible to flooding by the probable maximum flood event. The policy states consultation with the relevant council is required if the proposal will alter flood patterns other than to a minor extent and their response must be taken into consideration.

4.5 Protection of the Environment Operations (POEO) Act 1997

The POEO Act aims to protect and restore and enhance the quality of the environment in NSW, while still having regard to ecologically sustainable development.

With relevance to releases from the site, the Act aims to reduce risks to human health and to prevent degradation of the environment by promoting pollution prevention and the reduction in the use of materials and the re-use, recovery or recycling of materials. The Act contains the requirements for the management of such discharges and also the offences that relate to pollution. Section 148 requires that any pollution incidents or those that threaten material harm to the environment must be notified to the relevant authority (e.g., NSW Environment Protection Authority).

4.6 Soil Conservation Act 1938

This Act makes provision for the conservation of soil resources and for the mitigation of erosion. The act allows the Minister for Primary Industries[3] to issue soil conservation notices, declare areas to be sites of erosion hazard, proclaim works in catchment areas and outlines specific regulations in regards to the Rural Assistance Act 1989.

Of general relevance to this project is the promotion of sustainable use and prevention of loss of soil resources from a site.

[3] Except Parts 2A, 3 and 4, and sections 15 and 30A in so far as they relate to Parts 2A, 3 and 4, jointly with the Minister for the Environment

5.0 AVAILABLE DATA

Climatic data and water quantity and quality monitoring information are available in the region as outlined in the following sections.

5.1 Rainfall

The Bureau of Meteorology (BOM) has operated a single long-term station in the Hay region, although there are also two shorter duration stations, one of which is still open. None of these stations are located within the local catchment of the site. However, the associated records are indicative of the rainfall that can be expected in the region.

Table 1 outlines the average annual, maximum annual, maximum daily and maximum monthly rainfall values for the available rainfall stations which are indicated on Figure 4. Hay (Miller Street) is the only long-term station in the region and consequently the statistics derived from this record are less influenced by outlier events than for the sites with records of significantly shorter durations. The Hay CSIRO station period of record excludes rainfalls associated with the large historical regional flood events of 1956, 1974, 2010 and 2012 and this is reflected in the statistics for this station. The Hay Airport station has an average annual mean close to that for Hay (Miller Street) with comparable maximum monthly values. It is noted, however, that the statistics are not based on comparable periods of data.

Table 1: Rainfall Stations

Station Number	Station Name	Period of Record	Rainfall (mm)			
			Average Annual	Highest Annual	Maximum Daily	Highest Monthly
075031	Hay (Miller Street)	1877 - 2015	367.4	836.8	121.9	203.7
075175	Hay CSIRO AWS	1989 - 2007	256.5	418.4	51.0	84.6
075019	Hay Airport AWS	2007 -	362.9	662.6	85.8	184.8

Average monthly values for the three rainfall stations are presented in Table 2. Comparing a particular monthly value for the three stations demonstrates the point made previously in regard to comparing statistics for long-term stations against shorter term records. Mean monthly values for February, November and December are significantly higher for Hay Airport station than for Hay (Miller Street) station, which is a direct consequence of the bias of the wet 2010 and 2011 years on the shorter record for Hay Airport.

Table 2: Average Monthly Rainfall

Station Number	Rainfall (mm)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
075031	27.3	29.7	30.1	27.7	34.6	35.8	31.1	31.9	31.2	34.6	25.8	26.8
075175	28.7	18.5	15.9	12.8	20.5	24.9	27.7	23.8	22.9	26.4	20.7	16.6
075019	24.9	43.1	28.9	21.4	27.6	24.7	20.8	22.8	22.7	20.5	47.7	39.7

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LEGEND

- Rainfall Stations
- Electricity Transmission Line
- Cadastre
- Lot DP1187931

FOR DISCUSSION PURPOSES ONLY

DRAFT

0 500 1,000

1:30,000 @A3 METRES

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

NOTE(S)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

REFERENCE(S)

Electricity Transmission Lines, Cadastre: © State of NSW (Spatial Services - Department of Finance, Services and Innovation) 2018
Rainfall Stations: WaterNSW

CLIENT
ITP RENEWABLES

PROJECT
DARLINGTON POINT SOLAR - WATER ASSESSMENT

CONSULTANT
GOLDER

YYYY-MM-DD	19/12/2018
DESIGNED	BG
PREPARED	HB
REVIEWED	DP
APPROVED	JR

TITLE
FIGURE 4 AVAILABLE DATA

PROJECT NO.	CONTROL	REV.	FIGURE
18105488	016	A	4

Flood-producing weather systems across the region include inland troughs, cold fronts, and thunderstorms. Consequently, each rainfall event is a function of the prevailing meteorological conditions. Therefore, the longer Hay (Miller Street) record is considered to provide useful information on expected seasonal rainfalls in the area.

5.2 Streamflow

Streamflow records (Table 3) are available from the WaterNSW portal for a number of stream gauging stations in the region. Figure 4 indicates the location of these stations with reference to the proposed facility.

Table 3: Stream Gauging Stations

Station Number	Station Name	Available/Relevant Data	Comments
410001	Wagga Wagga, Murrumbidgee River	Flow, EC	Murrumbidgee regional flooding
410005	Narrandera, Murrumbidgee River	flow	Murrumbidgee regional flooding
410021	Darlington Point, Murrumbidgee River	flow	Murrumbidgee regional flooding
410136	Downstream Hay Weir Murrumbidgee River	flow	Murrumbidgee regional flooding

Generally, data from the available stream gauges do not provide specific information on local site flooding but are more useful in the context of assessing major regional flooding events that may impact on site access. This information is publicly available from the WaterNSW Real-time data portal and could be incorporated into site management plans.

5.3 Groundwater

The facility is located within an area underlain by the Murrumbidgee Alluvium, which comprises 4 groundwater units consisting of the Lower Murrumbidgee Shallow Alluvium, Lower Murrumbidgee Deep Alluvium, Mid Murrumbidgee Alluvium and Lake George Alluvium. The Lower Murrumbidgee Deep Alluvium and the Wagga Wagga area of the Mid Murrumbidgee Alluvium are the units from where the majority of groundwater is extracted.

Groundwater sourced from the Mid Murrumbidgee Alluvium supports agriculture in the nearby major irrigation districts of Murrumbidgee Irrigation Area (MIA) and the Coleambally Irrigation Area (CIA). Recharge to the Mid Murrumbidgee Alluvium also occurs through leakage from the Murrumbidgee River and its various tributaries and anabranches, infiltration from rainfall and irrigation activities.

Hay is situated above the Lower Murrumbidgee groundwater units, which have lower rates of extraction. Recharge to the Lower Murrumbidgee Shallow Alluvium occurs through leakage from the Murrumbidgee River and its various tributaries and anabranches, infiltration from rainfall and irrigation activity while inflow to the underlying Lower Murrumbidgee Deep Alluvium occurs primarily through downward leakage from overlying shallow alluvium.

Rising groundwater in selected areas of the Murrumbidgee River catchment has been a significant problem historically due to the risk of rising salinity concentrations in the root zone. The NSW government maintains

482 monitoring bores at 283 sites across the Murrumbidgee Alluvium. Figure 5 indicates the change in groundwater levels from the non-pumping period from 2005 – 2006 compared to the groundwater levels during the non-pumping period of 2015 – 2016, demonstrating there has been limited impact on groundwater levels around Hay over this period. The rise in groundwater level in the Mid Murrumbidgee Alluvium relates to recharge events from floods in 2010 and 2012.

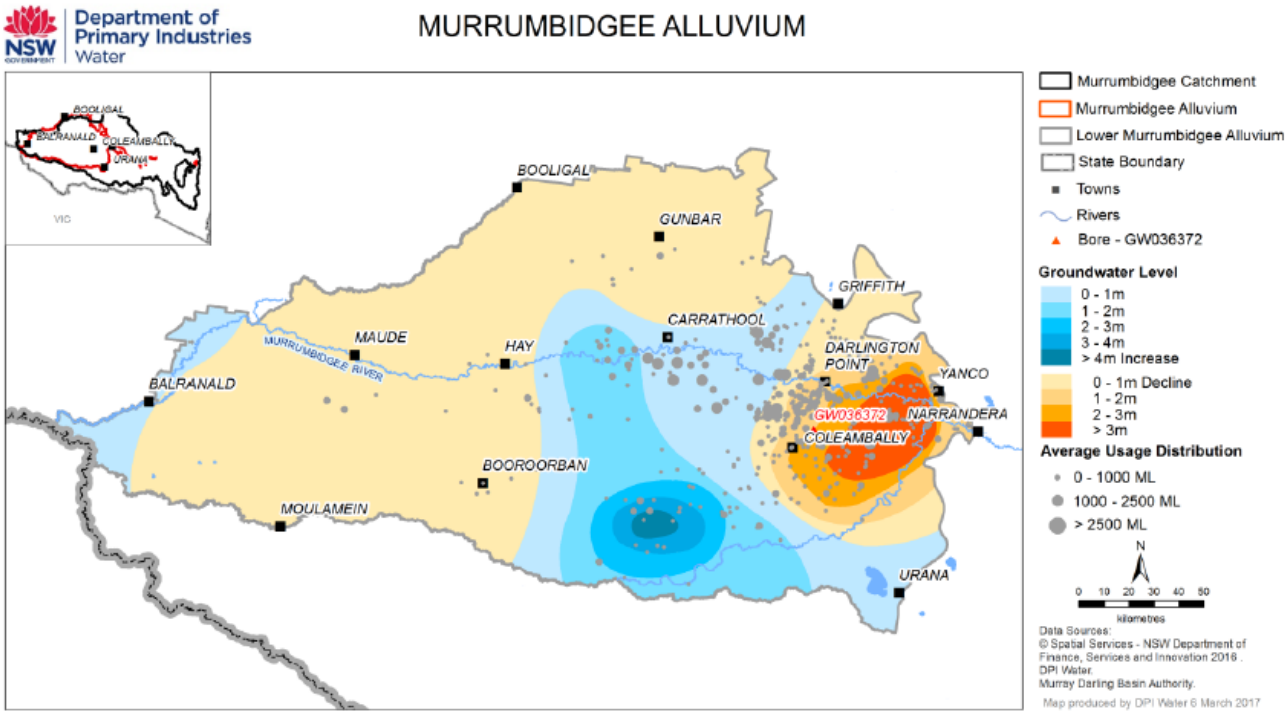

Figure 5: The change in groundwater levels during the non-pumping periods in the deep aquifer system of the Lower Murrumbidgee Alluvium from 2005-2006 compared to those of the 2015-2016 water years.[4]

[4] Figure 12 (SIP 2017)

6.0 POTENTIAL IMPACTS

Based on the current available information, potential adverse surface water-related impacts to the site include:

- Site accessibility and
- Managing downstream actionable nuisance.

6.1 Groundwater

The site is not located within an area listed as groundwater vulnerable in accordance with Hay Local Environmental Plan 2011 Clause 6.9. Although the site is within the broader Murrumbidgee River catchment area, which has a history of rising groundwater levels over the longer term in certain areas, this is not expected to be a concern at this site.

6.2 Flooding

Flooding associated with the Murrumbidgee River is not expected to result in inundation of the site. However, regional flooding may disrupt site activities particularly access to the site during construction for the workforce and material suppliers. Consequently, it would be prudent to incorporate monitoring of relevant gauging sites (rainfall and streamflow) with appropriate mitigation and/or management measures incorporated into relevant project plans.

6.3 Water Quality

The project has the potential to alter existing catchment conditions within the site. The impervious area of solar facilities is typically only marginally increased owing to associated hardstand and building areas. However, the panels may impact the nature of vegetation coverage on the site, which has the potential to increase surface runoff and peak discharge. Increased flow concentration off the panels also has the potential to erode soil at the base of solar panels (Cook & McCuen, 2013).

Furthermore, as the site has been historically used for agriculture there is very little natural ground cover vegetation as it has been mostly cleared for cropping and may have a build-up of residual agricultural-related pollutants. It is understood that soil types within the Lower Murrumbidgee vary considerably and include:

- Grey silty clay loams occur along ancestral stream and floodplain complexes in the Lowbidgee district and along the Murrumbidgee River.
- Grey, brown and red clays occur on the beds and floodplains of the Murrumbidgee River and associated creek systems.
- Red-brown earths occupy a large part of the eastern Riverine Plain, covering at least half of the Lower Murrumbidgee. These are moderately fertile and hold water well but are prone to erosion.

There is also limited available soil data in the Hay area although it is known to have dispersive, sodic grey soils. Consequently, there is the potential for site runoff to downstream drainage lines to contain increased sediments, resulting in increased turbidity, and elevated concentrations of other water quality parameters. With the limited topographic relief of the site, these issues are considered manageable.

7.0 PROPOSED MITIGATION MEASURES

7.1 Site Accessibility

The site accessibility issues may be managed in the project's risk management register(s) owing to the regional nature of the events and the potential to impact whole of site works. It would be prudent to consider engaging with local emergency management agencies.

7.2 Downstream Actionable Nuisance

Impacts associated with erosion and sedimentation resulting from construction activities can be minimised by undertaking works in accordance with provisions of the NSW government's best practice sediment and erosion control series Managing Urban Stormwater: Soils and Construction.

Proposed mitigation measures associated with managing downstream actionable nuisance are outlined in Table 4.

Table 4: Proposed Mitigation Measures

Stage	Measure	Activities/Approach
Design	Site drainage and water quality controls	Design Basis • Undertake hydrological assessment of the sites catchment in accordance with relevant methods outlined in Australian Rainfall and Runoff; • Determine sediment management targets and drainage control standards in accordance with Managing Urban Stormwater: Soils and Construction Vol 1 (Blue Book); • Develop a site erosion and sediment control plan in accordance with the Blue Book; • Develop site drainage design incorporating detention basins and sedimentation management structures where relevant. • Permanent site drainage should coincide with temporary arrangements where possible.
Construction and/or Demolition	Site drainage and water quality controls	General site works: • Catch drains to be located downslope of any proposed road works; • Install location appropriate sediment fences or other applicable control measures depending on whether the feature is upstream or downstream of a disturbed part of the site or will need to be trafficable; • All stormwater collection points need to have appropriate sedimentation and erosion controls; • Undertake ongoing inspections of stormwater facilities and water control measures to assess their effectiveness; • Vibration grids or wash bays at all construction exits • Level spreaders at locations where concentrated flow is discharged offsite to ensure sheet flow like conditions are maintained; • Flat land erosion control options include erosion control blankets, gravelling, mulching, soil binder, turfing and revegetation.
Construction and/or Demolition	Stormwater point source control	In the event of concrete works: • Do not undertake works if chance of heavy rain;

Stage	Measure	Activities/Approach
		• Store rinsate[5] water, if applicable, separately to other water on site and dispose of offsite as appropriate; • Block on site drains in the area of the works and remove any contaminated runoff. In the event that dewatering practices are required: • Pump hose intakes for withdrawing water from excavations will be elevated to minimise sediment pumping and directed to a containment area for settling prior to discharge; • Limit direct discharge off site (consistent with the design requirements for sediment pond discharge) Stormwater collected on site should be reused where possible. Controls should be inspected and maintained on a regular basis. All water released from sediment basins should be clear or disposed off site by vehicle. Material and waste storage areas should be designed and operated to minimise interaction with surface waters. Vehicle washdown areas should be located away from water courses.

[5] A dilute solution of chemical resulting from washing the container and equipment with water, as defined by NSW EPA accessed 20 December 2018 https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/authorised-officers/glossary#r

8.0 REFERENCES

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) Australian rainfall and runoff: a guide to flood estimation, © Commonwealth of Australia (Geoscience Australia), 2016

Bureau of Meteorology, 2012. Exceptional rainfall across southeast Australia. Special Climate Statement 39

Bureau of Meteorology 2018, Australian data archive for meteorology, online database, Commonwealth of Australia, viewed 23 August 2018, http://www.bom.gov.au/climate/data/

Cook, L. M., McCuen, R. H. (2013). Hydrologic response of solar farms, *Journal of Hydrologic Engineering*, v 18, n 5, p 536-541

DECC (2008). Managing urban stormwater: soils and construction Vol 2A

Green D., Petrovic J., Moss P., Burrell M. (2011) Water resources and management overview: Murrumbidgee catchment, NSW Office of Water, Sydney

Hay Local Environmental Plan 2011 (NSW) (Austl.).

Hay Shire Flood Emergency Sub Plan 2014 (NSW)

Holland, Dr J, Eastwood, Dr C, An evaluation of the current understanding of cotton-growing soils and soil management practice issues in Southern NSW (DAN1408) © NSW Department of Primary Industries, 2014

Hornbuckle, J., Christen, J., Thacker, J., Muirhead, W. and Stein, T. (2008). Soils of the Murrumbidgee, Coleambally and Murray irrigation areas of Australia II: physical properties. CSIRO Land and Water Science Report 23/08. CRC for Irrigation Futures Technical Report No. 02/08.

International Erosion Control Association (2008). Best practice erosion and sedimentation control guidelines

Landcom (2004). Managing urban stormwater: soils and construction vol. 1, Rev. 4th ed

Local Government Act 1993 (NSW) s.733 (Austl.).

Murrumbidgee Alluvium Water Resource Plan (GW9), Status and issues paper (SIP) © State of New South Wales through the Department of Industry, Skills and Regional Development, 2017

NSW Government (2005) Floodplain development manual

Spatial Services 2018, SIX Maps, online database, State of New South Wales through viewed Department of Finance, Services and Innovations,18 December 2018, https://maps.six.nsw.gov.au/etopo.html

State Environmental Planning Policy (Infrastructure) 2007 (NSW) s.15 (Austl.).

Water Management Act 2000 (NSW) s.5 (Austl.).

WaterNSW 2018, Real-time water data, online database, State of New South Wales through WaterNSW, viewed 18 December 2018, https://realtimedata.waternsw.com.au/

Signature Page

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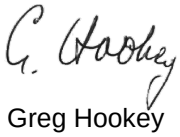

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APPENDIX A

Important Information Relating to this Report

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