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TABLES

FIGURES

5. LANDSCAPE CHARACTER AND VISUAL AMENITY

This section addresses Section 3.2.2 of the ToR. It describes the existing character of the landscape and visual amenity of the Project area. The potential impacts of the Project are considered within the context of the existing landscape character and visual environment and the changes that may occur during the construction and operation stages of the Project. This assessment is supported by maps and photographs.

5.1. Methodology

The landscape character and visual amenity assessment has been undertaken as follows.

Existing landscape character and visual amenity:

- site appraisals and reconnaissance, conducted in August 2010, to capture photographic images of the existing visual environment;
- determination of visual catchment - the definition of the visual catchment is "the area of land within which there is a view of any part of the proposed development" and is also referred to as the visual envelope map (VEM) (Landscape Institute & Institute of Environmental Management and Assessment, 2002). The visual catchment for the purpose of this assessment is within 5 km from the dam, the water storage area. Beyond this distance, visual sensitivity to the Project is regarded as low for all typical landscape settings. Due to the likely low visual nature of the pipeline and its smaller visual catchment a VEM is not proposed for it;
- description of the landscape character including landform and land use, supported by analysis of desktop topographic landscape information (i.e. terrain modelling). Where appropriate, reference is made to the relevant planning framework including planning schemes as identified in Chapter 7, for descriptions of landscape character;
- classification of the visual catchment into Landscape Character Units (LCU) which are distinct areas that share common landscape features and characteristics. Due to the likely low visual impact of the pipeline, the LCUs are only described and a LCU map has not been prepared;
- description of the existing visual amenity of the visual catchment supported by photographs that illustrate existing outlooks from viewing locations; and
- identification of potential sensitive receptors within close proximity to the Project (approximately 5 km).

Landscape and visual impacts:

- description of the sources of potential landscape and visual impacts associated with the Project, such as the water storage area, dam, any broad-scale clearing, realignment of roads, the pipeline, associated infrastructure; and
- description of landscape and visual impacts for LCUs and identified sensitive receptor such as homesteads, having regard to criteria such as scenic quality, visual and landscape sensitivity, and the significance of likely impacts.

Perceived visual impacts are relatively subjective and are predominantly related to the sensitivity of the viewing source. The potentially sensitive locations include:

- residential dwellings (especially those within 2 km of the Project);

- locations of public and private importance, such as parks or other recreational areas;
- tourist destinations and heritage sites; and
- major and secondary roads.

Residential dwellings are considered sensitive visual receptors to the extent that they would remain occupied during construction and operation of the Project. Residential dwellings that would be removed as part of the Project are not considered as sensitive receptors for the purpose of this assessment as they would be vacated prior to any potential visual impacts being experienced at these locations.

Roads are considered as sensitive receptors to the extent that views are altered for vehicle occupants. With the exception of travel through areas of high scenic values, visual impacts to road users are generally considered minimal and confined to the duration of time that an impact is in view of a vehicle occupant.

Mitigation measures have been proposed to minimise or avoid potential adverse landscape or visual impacts that may result from the Project.

5.2. Landscape character

The description of landscape character provides an overview of the varying and distinctive landscapes that exist within an environment. Rather than defining landscapes that are visually better or worse, landscape character describes the differences between landscapes and the elements that make them unique (such as the visual differences between a rural landscape and an urban environment).

In order to understand how a particular change to the visual environment would impact on identified sensitive receptors, it is necessary to determine the overall sensitivity of a particular landscape to change. Landscape sensitivity refers to the overall potential impact that would be expected on a sensitive receptor as a result of a change to a particular landscape. Landscape sensitivity does not define the nature and scale of the proposed activity but rather describes the overall ability of the existing environment to accommodate change. Landscape sensitivity levels are outlined as:

- Low Sensitivity – Very few visual impacts would be experienced as a result of the proposed change. A low sensitivity is either as a result of a proposed activity integrating efficiently with the existing environment and/or there are limited, or no, sensitive receptors with potential views of the proposed activity;
- Medium Sensitivity – Some visual impacts would be experienced as a result of the proposed change. A medium sensitivity is either as a result of a proposed activity only partially integrating with the existing environment and/or there are a few sensitive receptors with potential views of the proposed activity; and
- High Sensitivity – Significant visual impacts would be experienced as a result of the proposed change. A high sensitivity is either as a result of a proposed activity having no integration with the existing environment and/or there are numerous sensitive receptors with potential views of the proposed activity.

Different LCUs identified around the Project area and their overall level of perceived sensitivity is detailed in Table 5-1 and shown on Figure 5-2.

Table 5-1 Landscape character units – sensitivity to change

Landscape character units	Description	Landscape sensitivity	Relationship to Project
LCU 1 – Flat Agricultural Land	The landscape has been predominantly cleared of vegetation; however, tree-lined verges still exist along property boundaries, creek lines and roads. The landscape can include smaller constructed elements, such as road and rail networks, farm buildings, fences and power lines. The landscape is predominantly flat to undulating and expansive views are likely.	**Sensitivity to change: medium** Although modified from its natural form, views are generally over an undeveloped, expansive landscape. Any changes to the landscape are likely to be visible from a considerable distance.	Flat agricultural land exists in low lying areas along the Dawson River. These areas are generally cleared with patches of remaining and regrowth vegetation scattered throughout. Areas of flat agricultural land are also present in the Project area to the north of the Warrego Highway between Chinchilla and Dalby.
LCU 2 – Undulating Agricultural Land	The landscape has been predominantly cleared of vegetation; however, tree-lined verges still exist along property boundaries, creek lines, roads and hilltops. The landscape can include smaller constructed elements, such as road and rail networks, farm buildings, fences and power lines. The landscape undulates and views can either be restricted or expansive depending on the viewer's location within dips or on rises.	**Sensitivity to change: medium** Although modified from its natural form, views are generally over an undeveloped, expansive landscape. Depending on the viewing location, the rise and fall of the landscape provides the opportunity for both vantage points and visual barriers.	Undulating agricultural land exists in areas elevated above the flat agricultural land. This landscape character type is common throughout the Project area and is often a transitionary type between flat agricultural land and remaining vegetation.

Landscape character units	Description	Landscape sensitivity	Relationship to Project
LCU 3 - Natural Vegetation	The landscape occurs primarily in National Parks, State Forests, and local reserves; however, it can also exist in rural areas that have not been subjected to prior clearing activities. Generally, the vegetation has experienced very few modifications. Access into and within this landscape is usually limited to minor roads and access tracks.	**Sensitivity to change: high** Changes to this landscape as a whole would be highly visible from external vantage points. However, due to the legislative and environmental development restrictions generally in place, large scale changes to the landscape are unlikely. As vantage points within this landscape are limited due to the extensively vegetated and relatively inaccessible landscape, most views would be from external locations. Due to the predominantly dense nature of the vegetation, this landscape provides the opportunity to act as a visual barrier between a particular vantage point and the point of interest.	Areas of natural vegetation are present primarily along watercourses, on ridge lines and on plateaus. Areas of natural vegetation exist in the Project area to the north of Miles.

Landscape character units	Description	Landscape sensitivity	Relationship to Project
LCU 4 - Rural Townships	This landscape occurs at different locations usually along major road networks. Rural townships exist primarily to provide services or accommodation to nearby local communities. Development within this landscape is primarily confined to low-scale residential, commercial and industrial properties and some limited service businesses.	**Sensitivity to change: medium** Minor changes to this landscape are unlikely to conflict with the overall character. Views of this landscape would consist primarily of buildings, infrastructure and some vegetation. Due to the increased intensity of the sensitive receptors within this landscape, there is an increased level of sensitivity that should be considered.	Taroom is the nearest rural township to the Project Area, approximately 35 km south-west of the proposed dam wall. Other rural townships, including Wandoan, located on the Leichhardt Highway, and Boonarga, Brigalow, Ehlma, Warra and Macalister, all located on the Warrego Highway are near to the pipeline area.
LCU 5 - Townships	This landscape is generally located at key locations throughout the broader environment, such as watercourses or large scale employment opportunities, such as rail yards, ports or industrial facilities. Development within this landscape generally consists of residential properties situated around a town centre and its associated employment, education and health services.	**Sensitivity to change: medium** Minor changes to this landscape are unlikely to conflict with the overall character. Views of this landscape would consist primarily of buildings, infrastructure and some vegetation. Due to the increased intensity of the sensitive receptors within this landscape, there is an increased level of sensitivity that should be considered.	Chinchilla and Dalby are the nearest townships to the Project area. Both townships are located near to the proposed pipeline route.

5.3. Description of environmental values

This section describes the existing landscape character and visual amenity of the Project area. The description includes an overall impression of the landscape throughout the Project area, and describes existing landscape features, panoramas as well as views that have, or could be expected to have, value to the community.

5.3.1. Dam and surrounds

5.3.1.1. Landforms

The visual catchment comprises three distinct landforms, including:

- the Dawson River catchment and its tributaries;
- the floodplain and low lying, gently rolling slopes of the valley floor; and
- the surrounding steeper and elevated slopes and ridgelines.

The dam site is located on the Dawson River at AMTD 315.3 km which is approximately 11 km downstream of Glebe Weir and approximately 2 km upstream of Nathan Gorge. Within the Project site, the Dawson River flows through a small valley that is bordered by an undulating landscape. A number of creeks and streams flow into the valley to join with the Dawson River.

Two high points are located within proximity to the water storage area, Glebe Mountain to the south and Mount Moss to the north. As these high points are located within private properties, access to these potential viewing locations is limited. The elevation of the low lying area is generally between 170 m and 190 m above sea level. The Dawson River and the valley are surrounded by gradual slopes which rise 200 m to 450 m towards the high points that enclose the visual catchment of the valley. Figure 5-1 is a topographic map which identifies the surrounding landforms.

The Dawson River valley has been heavily modified, with vegetation thinned and cleared to allow for grazing and agricultural development. Riparian vegetation generally remains along the banks of the Dawson River and the adjacent creeks.

Nathan Gorge and the surrounding elevated landscape have not been used for agricultural activities and as a result, have retained a predominantly natural vegetated appearance.

On the banks of the Dawson River, towards the west, is the township of Taroom. Taroom is a small rural town that provides the basic services for the residents within the town and for the surrounding agricultural properties. The township is located on land that is elevated above the valley floor. Vantage points for northern and north-eastern views across the valley floor are available from the northern extent of the township.

Immediately upstream of Glebe Weir, the Dawson River is approximately 200 m wide and is a prominent visual feature within the valley landscape. Adjacent to Glebe Weir is the Glebe Weir Camping Reserve, a recreational area that contains a number of public amenities, including barbeques and toilet facilities. Views of Glebe Weir and the Dawson River are available from this recreational area.

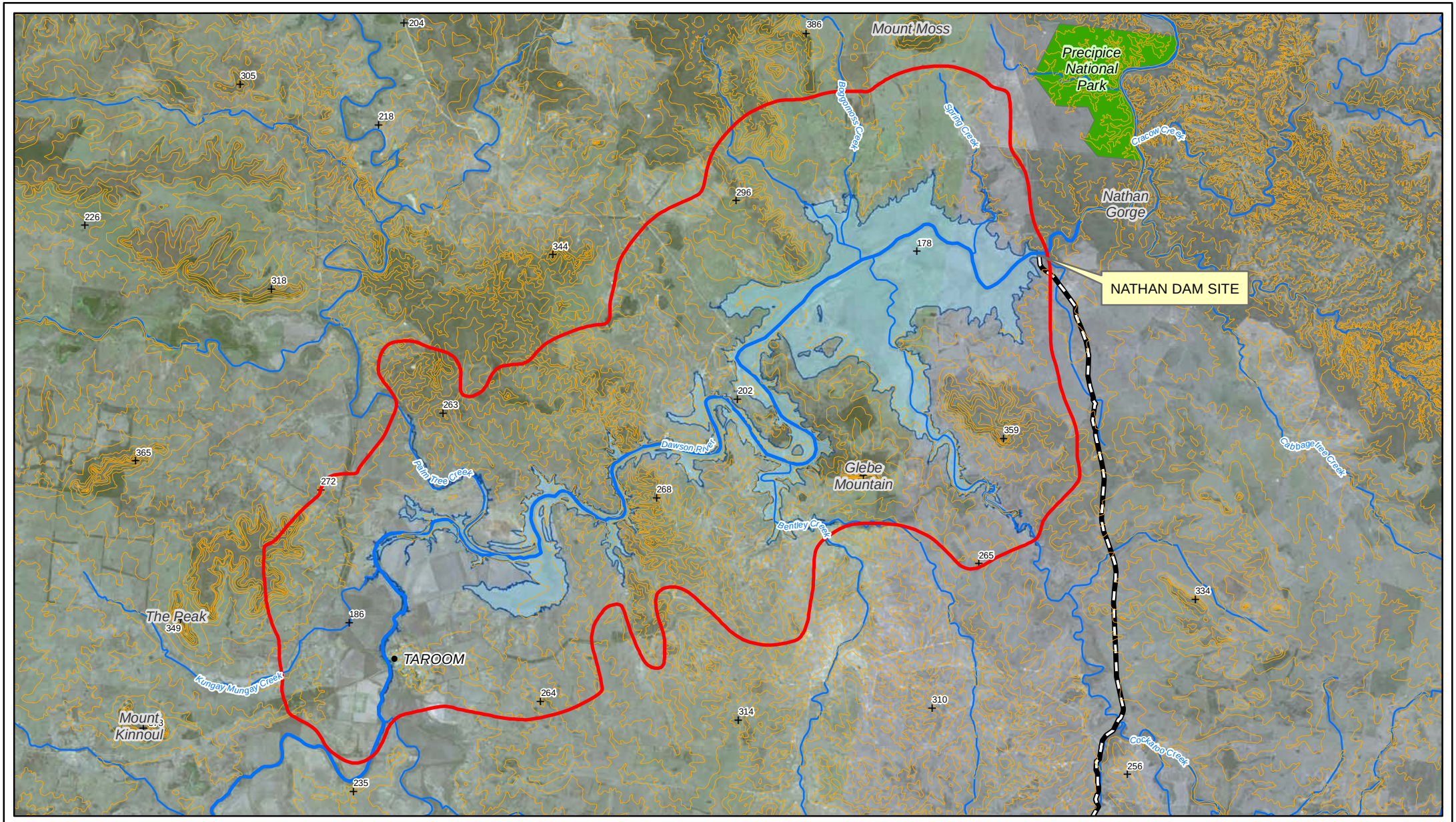
The extent of the visual catchment for the Nathan Dam and water storage is shown on Figure 5-1 and includes:

- grazing land and remaining vegetation;
- homesteads;
- elevated areas including Glebe Mountain and Mount Moss;
- local roads that would be subject to relocations and upgrades as a consequence of the Project; and
- public viewing sites, such as within the Taroom township and the recreational area at Glebe Weir.

The visual catchment is dominated by the low lying landscape adjacent to the Dawson River, the surrounding rolling landscape and intermittent patches of vegetation. Grazing dominates the Dawson River floodplain, with large areas of cleared land within the valley.

Within the visual catchment are a number of residential properties that currently have expansive views over the Dawson River and the associated low-lying area (Figure 5-15). Residential properties have only been considered for the purposes of this visual assessment if they are to remain occupied during or after development. Residences that are not occupied or would be moved as part of the Project are not considered in the assessment. For example Spring Creek is not expected to be occupied during construction and Glebe Homestead will not be occupied after dam closure. Potential views of the Project from residential properties are described in Section 5.4.1.

The strategic directions from the Taroom Shire Planning Scheme provide limited statements on the landscape values that are considered important to protect. Generally, the planning scheme recognises the need to appropriately protect and enhance protected areas and other key areas of environmental or heritage significance, such as riparian vegetation. The planning scheme identifies the predominant land use in the area as rural and as such, the primary purpose is for the growing of crops, horticulture and/or the keeping of livestock. Land uses are discussed in Chapter 7.



LEGEND

- Spot Elevation
- Towns
- Watercourse
- Dawson River
- Contours (20m Interval)
- Proposed Pipeline
- Visual Catchment
- National Park
- Full Supply Level (183.5m AHD)

Projection: GDA94 Zone 56

Figure 5-1

0 1.5 3 6
Kilometres

N

Scale 1:250,000 (at A4)

SKM SunWater Making Water Work

NATHAN DAM AND PIPELINES EIS

Topographic features and visual catchment of dam and surrounds

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5.3.1.2. Landscape character

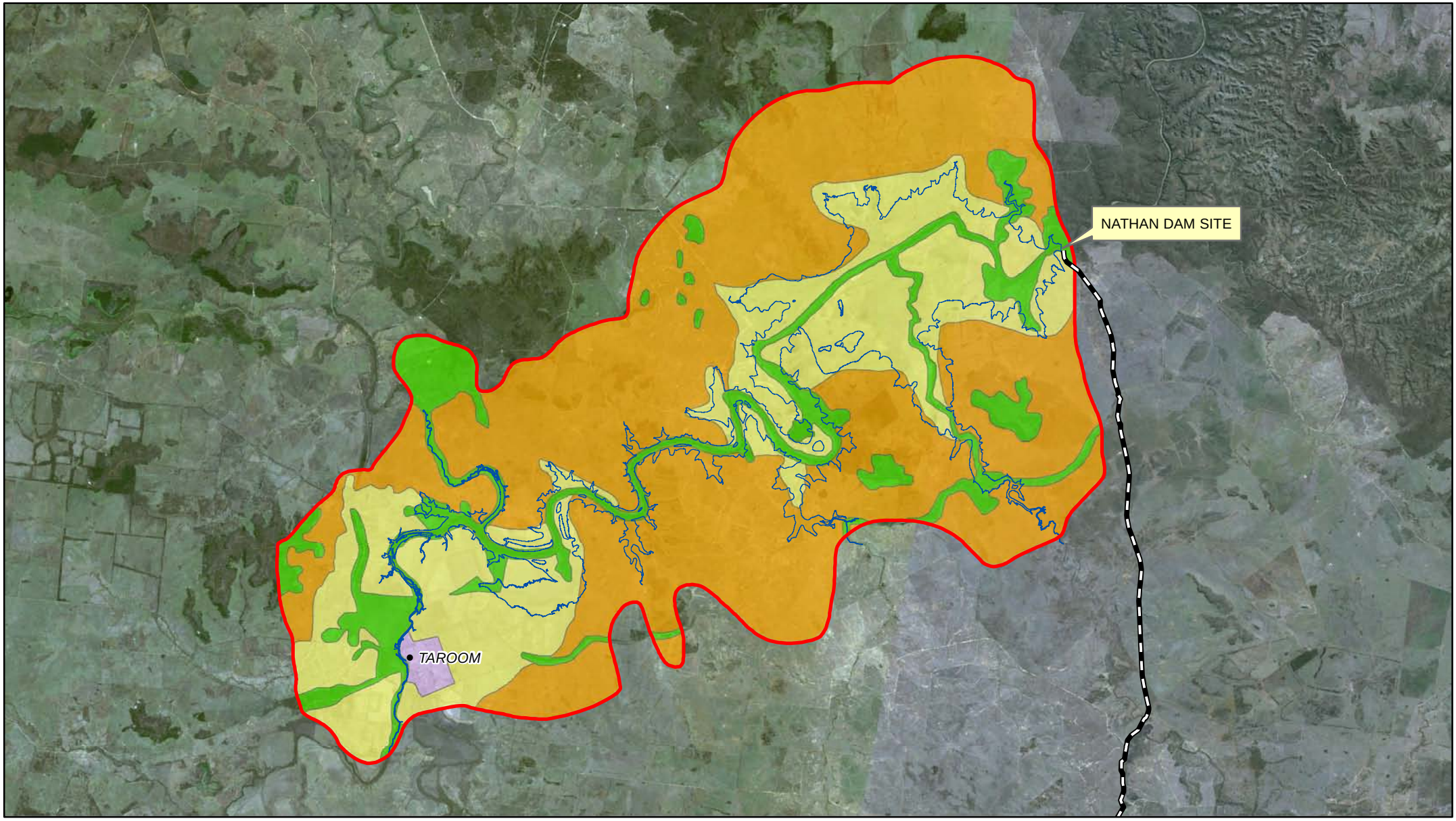
Overall, the visual catchment is predominantly of a rural character and has been substantially cleared of native vegetation in the lower lying parts of the valley. The steeper escarpments within the valley have retained a more natural vegetated environment.

The visual catchment has been classified into LCUs to provide a foundation for the identification of the landscape character and visual amenity and assessment of the potential impact of the Project. LCUs are identified in Table 5-2 and shown in Figure 5-2.

Table 5-2 Landscape character units – dam and surrounds

Landscape character unit	Description of character elements
LCU1 – Flat Agricultural Land	■ Includes land on the valley floor. ■ Land use is primarily for grazing, with some cropping. ■ Cleared grassland and areas of open forest vegetation dominate. ■ The Dawson River and associated tributaries are prominent features.
LCU2 – Undulating Agricultural Land	■ Primarily situated at the outer edges of the valley, however, does occur throughout the landscape. ■ Land use is predominantly grazing. ■ Vegetation is sparse and has been substantially cleared for grazing. ■ Some areas of remaining vegetation.
LCU3 –Natural Vegetation	■ Areas of natural, riparian vegetation are situated along the banks of the Dawson River and its associated tributaries. ■ Areas of natural vegetation interspersed throughout the landscape amongst agricultural lands. ■ Vegetation varies in density with the greatest concentration along the watercourses.
LCU 4 – Rural Townships	■ The Taroom township is a small, service centre located on the south western edge of the inundation and buffer. ■ Consists primarily of low-set residential properties and basic service facilities. ■ Contains a number of public open spaces. ■ Contains a greater number of sensitive receptors than other identified LCUs.

Overall, the landscape character of the inundation and buffer has a medium to high sensitivity to change. The agricultural lands have been previously disturbed enabling them to better absorb change to the visual landscape. However, the clearing of vegetation as a result of this disturbance to agricultural development has resulted in increased viewing distances, particularly within areas of flat agricultural lands. There are areas of remaining vegetation which provide a natural visual barrier between vantage points and points of interest reducing visual impacts, but the loss of this vegetation would result in changes to the visual environment. The overall sensitivity of the landscape is increased by the greater number of people located within the Taroom Township.



LEGEND

- Towns
- Proposed Pipeline
- Full Supply Level (183.5m AHD)
- Visual Catchment

Landscape Character Units

- LCU1: Flat Agricultural Land
- LCU2: Undulating Agricultural Land
- LCU3: Remnant Vegetation
- LCU4: Rural Townships

Projection: GDA94 Zone 56

Figure 5-2

0 1.5 3 6
Kilometres

N

Scale 1:250,000 (at A4)

SKM SunWater Making Water Work

NATHAN DAM AND PIPELINES EIS

Landscape character units

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5.3.1.3. Visual amenity

The visual landscape is predominantly the result of a modification to large areas of land cleared of vegetation for grazing activities and consists of a mix of agriculture uses and open bushland. The predominantly cleared landscape provides for expansive views that are periodically disrupted by stands of isolated vegetation at high points or along watercourses.

Within the Project area and the surrounding landscape, due to the small number of vantage points, there are limited opportunities for expansive views. Prominent vantage points are primarily limited to the confines of the Taroom Township, the Leichhardt Highway and the local roads.

The following section provides descriptions of the aspects that contribute to the existing amenity of the visual catchment.

Due to the isolation of the dam site, the roads within and adjacent to the proposed inundation and buffer are not major roads and are mainly used by local residents and therefore have limited use by travellers. The experience for travellers moving through the proposed dam and surrounds is of predominantly short to long range views of parts of the visual catchment. Views are of low lying areas, gradual rises and hills to open bushland and thickly vegetated areas. Views are restricted by vegetation and topography however some more expansive views are available from elevated locations to the north and south of the valley and from the north-eastern extent of the Taroom Township.

Travelling across the valley floor, the perception is of a landscape that has been substantially modified through land clearing, grazing and rural activities. There is minimal presence of residential dwellings throughout the inundation and buffer.

An assessment of the existing viewsheds for each LCU identified in Section 5.3.1.2 was undertaken and is described in Figure 5-3 to Figure 5-8.

Description: This view is from the recreational area adjacent to Glebe Weir. The flat landscape enables expansive views towards the elevated rises visible in the photograph, approximately 5 km from the view point. These expansive views are only disrupted by intermittent patches of vegetation.

Figure 5-3 LCU1 – View of flat agricultural land north of Glebe Weir

Description: This view is from Glebe Road looking north across the valley floor. From this elevated location, expansive views are possible and are only partially interrupted by vegetation or the rolling landscape.

Figure 5-4 LCU1 – View of flat agricultural land along Glebe Road

Description: This view is of the undulating landscape that is prevalent within the visual catchment. Views from this low point are disrupted by intermittent patches of vegetation and rises in the topography of the landscape.

Figure 5-5 LCU2 – View of undulating agricultural land north of the Dawson River

Description: This view is of the Dawson River immediately upstream of Glebe Weir and the riparian vegetation located on the southern banks of the river. At this location, the Dawson River is approximately 200 m in width and expansive, unimpeded views to the far banks are available. This view is not a common occurrence within the broader landscape and is made available by the presence of Glebe Weir.

Riparian vegetation is present along both sides of the Dawson River. This vegetation limits views of the landscape beyond the banks of the river.

The presence of water within the view provides diversity to the visual environment of the Project site and as a result, would be considered to be a visually attractive feature. This visually positive feature is reflected by the presence of the public recreational and camping area.

Figure 5-6 LCU3 – View of remaining vegetation along banks of Dawson River at Glebe Weir

Description: The riparian vegetation at this location dominates the view and has formed a canopy over the river, therefore reducing the availability of natural light entering the environment. While this view is of a predominantly natural landscape, stock access to the river has resulted in altered views.

The relatively dense riparian vegetation limits potential views beyond the Dawson River and its banks.

Figure 5-7 LCU3 – View of remaining vegetation along banks of Dawson River at Bundulla Road

Description: This view is of the Leichhardt Highway that passes through Taroom. Taroom is a small service town that is occupied by low-rise buildings that are aligned along small, grid patterned streets. Commercial and community service buildings are primarily located along the Leichhardt Highway and as such, are the most visually prominent features for people passing through the township.

Figure 5-8 LCU4 – View of main street in Taroom Township

5.3.2. Pipeline

The existing landscape character and visual amenity of the pipeline varies due to the different landscapes the route traverses. The pipeline generally follows power, road and railway easements from the dam to its destination in Dalby. The pipeline would be located underground, apart from a section where it traverses the Great Dividing Range from approximately 7.5 km east of Guluguba to approximately 22 km north east of Miles.

5.3.2.1. Landforms

The visual catchment contains four distinct components, including:

- the Nathan Road easement from near the dam wall to Wandoan Township;
- Wandoan to Chinchilla via private properties adjacent to state forests;
- the Warrego Highway from Chinchilla to Dalby; and
- private properties along the pipeline that would accommodate the pipeline and associated pipeline infrastructure.

The pipeline traverses a highly modified environment of infrastructure easements, local roads and the Warrego Highway. The surrounding area consists of grazing properties that have been partially cleared to allow for grazing activities.

Between the dam wall and Wandoan, the pipeline traverses undulating grazing land that is intermittently disrupted by patches of vegetation and winding roads and watercourses.

Between Wandoan and Chinchilla the pipeline traverses land adjacent to the Binkey and Barakula State Forests. The adjacent land is privately owned and is extensively vegetated.

Between Chinchilla and Dalby, the pipeline traverses land adjacent to the Warrego Highway. The landscape within the area is relatively flat and is primarily occupied by horticultural and cropping activities.

The pipeline traverses through, or within the outskirts of, Wandoan, Chinchilla, Boonarga, Brigalow, Ehlma, Warra, Macalister and Dalby Townships.

5.3.2.2. Landscape character

Overall, the visual catchment is predominantly of a rural character and has been substantially cleared of native vegetation in the northern and southern sections of the pipeline. Although present in sections along the entire length of the pipeline, remaining vegetation is most prevalent between Wandoan and Chinchilla.

The visual catchment has been classified into LCUs (Table 5-3).

Table 5-3 Landscape character units – pipeline

Landscape character unit	Description of character elements
LCU1 – Flat Agricultural Land	■ Is most prevalent in the southern section, between Chinchilla and Dalby. ■ Land use is primarily for grazing at the northern end and cropping at the southern end (between Chinchilla and Dalby). ■ Mixture of cleared grassland, cultivated fields and areas of open forest vegetation. ■ Numerous small creeks and tributaries transect the route.
LCU2 – Undulating Agricultural Land	■ Primarily located between the northern extent of the pipeline and Wandoan. ■ Land use is predominantly grazing. ■ Vegetation is sparse and has been substantially cleared for grazing. ■ Some areas of remaining vegetation.
LCU3 –Natural Vegetation	■ Substantial areas of remaining vegetation exist between Wandoan and Chinchilla. ■ Areas of natural, riparian vegetation are situated along the banks of the numerous creeks and tributaries. ■ Areas of remaining vegetation interspersed throughout the land cleared for agricultural uses. ■ Vegetation varies in density with the greatest concentration of vegetation along the watercourses.
LCU 4 – Rural Townships	■ Wandoan Township is a small, service centre located on the Leichhardt Highway between Taroom and Miles. ■ Boonarga, Brigalow, Ehlma, Warra and Macalister Townships are small, rural towns located on the Warrego Highway between Chinchilla and Dalby. ■ Consists primarily of low-set residential properties and basic service facilities. ■ Contains a number of public open spaces.
LCU5 – Townships	■ Chinchilla and Dalby are regional townships that provide residential dwellings, employment opportunities and services for the broader region. ■ Commercial development is primarily focused around the main transport networks of the Warrego Highway and the rail line. ■ Residential uses are primarily low-set, detached dwellings interspersed with some small multiple unit developments. ■ Contains a number of public open spaces. ■ Contains a greater number of sensitive receptors than other identified LCUs.

Overall, the landscape that the pipeline traverses has a medium to high sensitivity to change. While the agricultural lands have previously been disturbed, therefore enabling them to better absorb change to the visual landscape, the clearing of vegetation as a result of this disturbance has resulted in increased viewing distances, particularly within areas of flat agricultural lands.

The presence of natural vegetation assists to create a natural visual barrier between a vantage point and an area of impact. While the loss of this vegetation would result in changes to the visual environment, due to the extensive nature of the remaining vegetation between Wandoan and Chinchilla, minor changes to the landscape are likely to be partially or completely shielded by vegetation and as a result, sensitivity to change at this location is lower.

The overall sensitivity of the landscape is increased by the greater number of people and potential vantage points located within the townships.

5.3.2.3. Visual amenity

The visual landscape is predominantly occupied by land that is cleared of remaining vegetation for grazing or cropping purposes and is relatively fragmented in appearance due to human disturbance.

The remaining vegetated areas within and adjacent to the State forest areas between Wandoan and Chinchilla provide a high degree of visual amenity as they are expansive areas of relatively natural vegetation that is not common within the broader region. However, due to limited access to these vegetated areas, visibility from key transport routes, such as the Leichhardt Highway, is unlikely.

The presence of the townships provides the visual environment with a distinctive human element that may not be obviously apparent in areas dedicated entirely to agricultural activities and which are sparsely populated.

The experience for travellers moving along the pipeline, where it is possible to do so, is predominantly that of views of grazing and cropping properties with expanses of level land comprising low density native vegetation. The roads along the pipeline are a mix of State and local controlled roads. The local roads in the area are primarily only used by local residents and have a low level of utilisation and therefore, limited potential viewers. The State roads, such as the Leichhardt Highway and Warrego Highway, have a greater level of traffic use and as such, a greater number of potential viewers.

The Warrego Highway is the primary route from Toowoomba to Charleville and is utilised by a large number of people for a wide range of travelling purposes. Part of the pipeline would run parallel to the highway. Travelling along the highway between Chinchilla and Dalby, the views are of low lying grazing and cropping land. Views are at times restricted by thick roadside vegetation and undulating terrain; however some more expansive views are possible.

Travelling through the various townships would provide a visual experience that is vastly different to the broader landscape. The greater concentration of buildings, people, infrastructure and traffic provides contrast to the views of rural and vegetated landscapes that are more common along the pipeline.

The pipeline visual catchment is affected by infrastructure such as road, rail and powerline easements with the perception of a landscape that has been substantially modified, often devoid of vegetation and highly influenced by human activities.

Large proportions of the pipeline, particularly when it traverses through private land between Wandoan and Chinchilla, would only be visible to the private landholders and not to the wider community and as such, would offer limited contribution to the overall visual amenity for a traveller.

An assessment of the existing viewing outlooks for each LCU was undertaken and is described in Figure 5-9 to Figure 5-14.

Description: This view is of agricultural cropping land. As the landscape is flat and has been cleared of native vegetation, expansive views are available. Views are only disrupted by strips of vegetation that run along cropping boundaries or by man-made structures.

Figure 5-9 LCU1 – Flat agricultural land adjacent to the Warrego Highway, east of Chinchilla

Description: This view is near Cracow Road. The land is primarily utilised for grazing activities and as such, has not been subjected to the extensive clearing activities associated with cropping activities. Views over the landscape from this elevated location are expansive with disruptions generated by other high points and areas of remaining vegetation.

Figure 5-10 LCU2 – Undulating agricultural land south of the Dawson River

Description: This view is of the remaining vegetation associated with the State forests and the nearby vegetated private lands. Views within the landscape are constrained and long views are only available along roadways or other infrastructure easements.

Figure 5-11 LCU3 – Remaining vegetation south of Wandoan

Description: This is a rural town that contains a small number of residential and commercial properties.

The most visually prominent features of the township are the grain silos that are situated between the Warrego Highway and the rail line. The grain silos are tall structures that are visible on the approach to the township and dominate the visual landscape within it.

Figure 5-12 LCU4 – Brigalow Township

Description: Heeney Street is the main business centre within Chinchilla and is fronted by numerous commercial businesses and community facilities.

The wide roadway allows for long views along the street that are only disrupted by traffic and the footpath vegetation.

The Warrego Highway is the primary road for traffic passing through Chinchilla. As a result, views of passing through traffic, including large agricultural and mining vehicles, are uncommon on Heeney Street.

Views within Chinchilla are of a developed landscape that is a contrast to the surrounding dominant agricultural environment. Views within the landscape are constrained by development and long views are only available along roadways or other infrastructure easements. The pipeline does not impact Heeney Street.

Figure 5-13 LCU5 – View of Chinchilla business centre

Description: Dalby's purpose as a large rural centre is reflected by the visually prominent commercial properties that are situated along the Warrego Highway.

Views within Dalby are of a developed landscape that is a contrast to the surrounding dominant agricultural environment. Views within the landscape are constrained by development and long views are only available along roadways or other infrastructure easements. The pipeline will not pass through this part of Dalby.

Figure 5-14 LCU5 – View of Warrego Highway through Dalby

5.3.3. Associated infrastructure

Associated infrastructure such as roads, power and telecommunications infrastructure, in the water storage area will require relocation or upgrade. The associated infrastructure for the Project is described further in Chapter 2.

5.3.3.1. Landforms

The associated infrastructure would be located within a similar location to the dam and surrounds and as such, is located within an area with the same landforms. Section 5.3.1.1 provides an overview of those landforms.

5.3.3.2. Landscape character units

Section 5.3.1.2 provides an overview of the landscape character for the dam and surrounds.

5.3.3.3. Visual amenity

Section 5.3.1.3 provides an overview of the visual amenity and the traveller's experience for the dam and surrounds

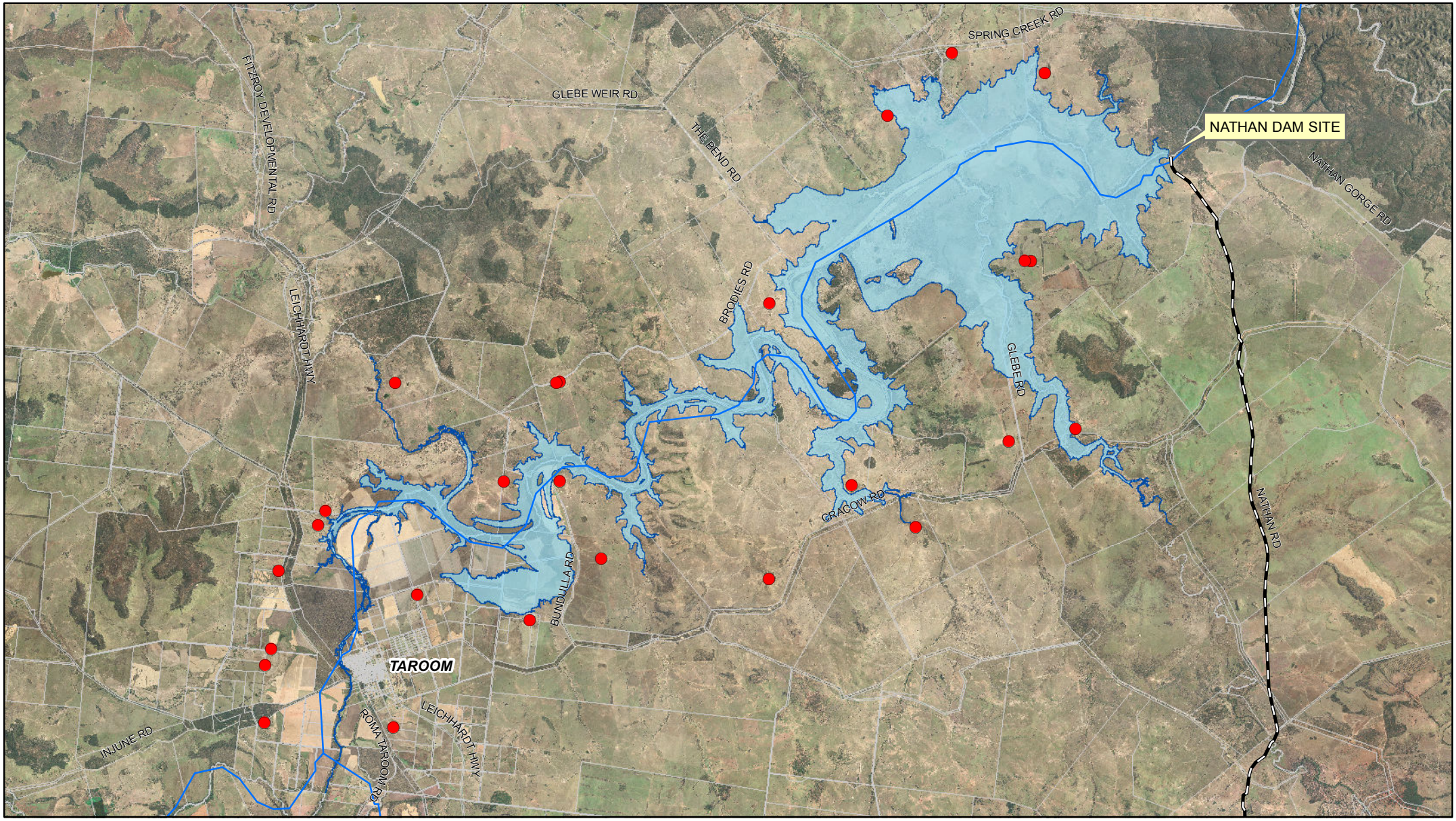
5.4. Potential impacts and mitigation measures

5.4.1. Dam and surrounds

5.4.1.1. Potential impacts

The remoteness of the dam and surrounds, private ownership of most properties surrounding the dam site, limited public land and closed topography limits the number of people likely to have views of the dam and therefore be potentially affected by construction or operation of the dam. Although the landscape character of the land to be occupied by the dam would be changed as a result of the Project, access to the construction area, including the clay extraction sites, would be closed to the public; significantly mitigating potential construction phase visual impacts. Potential views would be likely from nearby high points, Glebe Mountain and Mount Moss, however, there is no access to these locations for the general public.

Currently, one residence (Glebe Homestead) is located within FSL and has been identified for removal as part of the Project. There are 25 other residential properties located outside of Taroom that may have views of parts of the Project's water storage area (Figure 5-15). These properties are generally located within 2 km of the water storage area at elevated locations. They are primarily accessible from Cracow Road, Glebe Weir Road, Brodies Road, Glebe Road, The Bend Road and Roma Taroom Road.



LEGEND

- Sensitive Receiver
- Proposed Pipeline
- Major Watercourse
- Full Supply Level (183.5m AHD)
- Cadastre

Projection: GDA94 Zone 56

Figure 5-15

0 1.25 2.5 5
Kilometres

N

Scale 1:200,000 (at A4)

SKM SunWater Making Water Work

NATHAN DAM AND PIPELINES EIS

Sensitive receivers with potential views of the water storage area

I:\QENV2\Projects\QE40192\400 - Nathan - Spatial\ArcMXD\Figures\050_Landscape CharacterVisual Amenity\Figure_5-15_SensitiveReceivers_with_PotentialViews_of_Inundation.mxd Produced: 9/06/2011

Views of the upper extent of the water storage area would be likely from the northern, north-eastern and western extents of the Taroom township. However, in this area the water storage is contained within the existing bed and banks of the river. Due to its relatively minor elevation above the valley floor, views to the north east are expansive and would be altered as a result of the presence of the Project's water storage area. While this would result in a change to the visual environment, views of the water storage area may be perceived to be positive. The dam could be accessed for recreational and other purposes and would provide a visual point of difference within the surrounding landscape.

The construction camp and site offices are expected to result in some change to the visual environment, however, this will only be during construction of the dam. Nonetheless, the construction camp to be established in Taroom will be located in an area that would minimise visual change. Construction traffic will have some impacts, however, these are likely to be limited to areas in close proximity of construction activities. These impacts are likely to be minor due to limited sensitive receptors and the presence of other nearby visual features such as undulating terrain and vegetation.

During construction clay borrow areas would be established within the proposed water storage. The clay borrow areas would be visible to some nearby sensitive receptors during construction. Once the Project is operational, these areas would be inundated and no longer visible.

The potential impacts to the landscape character and visual amenity of the elevated rises surrounding the dam and water storage would be negligible with no construction work to be carried out in these elevated areas. However, once the water storage reaches FSL, views of these elevated rises are likely to include views of the water body.

The Glebe Weir Camping Reserve, located on the northern bank of the Dawson River, is the only public area outside of the Taroom Township within close proximity to the inundation area. However, as it would be inundated at FSL, it is not considered a sensitive visual receptor.

Once operational, other changes to the existing visual environment include:

- new structures including the pump stations and changes to landforms, such as road realignments;
- vegetation rehabilitation, that would eventually blend in with the existing vegetation within the visual environment; and
- recreational facilities such as day use facilities and boat ramps located on each side of the water storage.

Tree and shrub vegetation will be mechanically cleared to within 1.5 m (vertical) of FSL such that vegetation will remain within the riparian zone of tributaries and the main channel. Vegetation located within the FSL that is not cleared is expected to eventually die and 'dead soldiers' would remain. Views of the deceased trees from along the banks of the inundation area would be possible, however, it is expected that these views would be sufficiently accommodated within the broader visual environment. There will be some areas along the banks of the Dawson River within the township of Taroom, as well as one residence west of Bundulla Road where views of deceased vegetation will be prominent.

Impacts of these features on landscape or visual amenity would be minor as they would be accommodated sufficiently within the existing visual environment, would be consistent with the existing visible features or would only be visible to a small proportion of the population.

5.4.1.2. Mitigation measures

The major mitigation strategy for visual impacts during construction is the isolation of the works site from public access and viewing. This immediately reduces potential visual impacts to negligible levels. Construction and operational mitigation measures recommended to minimise the potential visual impacts are:

- management of night lighting to ensure lights are focused on the affected construction areas, limiting extraneous light;
- protection and management of native vegetation within and adjacent to the construction area (but outside the inundation and buffer) with particular emphasis on conserving vegetation which would surround the finished dam;
- should the visual impact of deceased trees inundated within the upper reach of the storage prove to be significant, dead trees could be removed during a dry period; and
- landscaping and re-vegetation of areas impacted by construction outside the inundation and buffer.

Mitigation measures at the clay extraction sites would not be required during construction due to their temporary nature and the restricted access. Clay extraction sites will be inundated so have no ongoing visual impact.

5.4.2. Pipeline

The pipeline would be buried for the majority of its length. Although proposed to be trenched, there is one section of pipeline (approximately 45 km) which is dominated by shallow stony topsoils and underlain by low to medium strength rock from about 1m in depth. At this stage it is unknown whether or not this material can be successfully excavated. Sections of pipeline in this area are therefore likely to be placed above ground, although the pipeline will be buried in any sections of the area that will allow trenching to the required depth. This section of pipeline is generally away from sensitive receptors.

Three pumping stations and balancing storages would be located at locations along the pipeline. These pumping stations and balancing storages would be located:

- immediately south of the junction of Cracow Road and Nathan Road;
- approximately 1km north of the junction of Nathan Road and Bowling Road, within the Nathan Road road reserve; and
- adjacent to Stiller Bros Road;

The pumping stations and balancing storages are described in Section 2.3.2.2 and typical examples are shown in Figure 2-20 in Section 2.3.2.3.

5.4.2.1. Potential impacts

Potential visual impacts may occur from the construction of the pipeline due to:

- vegetation clearing;
- trenching and mounding of spoil;
- construction camps;

- construction of above ground infrastructure such as pump stations, balance tanks, surge tanks, etc;
- construction parking and traffic movements; and
- temporary construction worksites and lay down areas.

The potential visual impacts that may occur during the operational phase are identified as follows:

- above ground structures, including balancing storage and pumping station facilities;
- access tracks to service the pipeline;
- security fencing; and
- signage.

Temporary visual impacts to passing motorists and people within the townships would occur during the construction phase. Pipe laying is, however, a mobile activity with works being undertaken in a particular area for generally less than a few days. The exceptions relate to the more substantial items of above ground infrastructure, lay down areas, stockpiles and vegetation clearing. Sensitive receptors, such as residents along the route would be impacted, albeit temporarily.

Permanent changes to the visual environment would be as a result of ongoing clearing within the pipeline easement and where sections of the pipeline and pipeline infrastructure are above ground. Views of above ground sections of the pipeline traversing the Great Dividing Range would be limited by the nature of the undulating land and the vegetation. Views of these above ground sections of the pipeline would be confined to passing traffic when it is within a road corridor and residents when it is within a private property.

Where possible, the pipeline above ground infrastructure would be located away from sensitive receptors, to reduce their impact. The potential for travellers viewing such structures would be restricted due to the speed of the traffic travelling at 100 km/h on most roads adjacent to the pipeline.

The pipeline is to skirt the small towns by using existing utility easements and would be buried, therefore eliminating the visual impact after construction. However, any visible components would be considered to be acceptable within the visual environment as they are located within a utility easement. In Dalby, the infrastructure at the discharge end of the pipeline may be visible to the public.

Pumping stations and balancing storages would be required at locations along the pipeline. Generally, due to their size and contrast to the surrounding visual environment, these structures would be visually prominent features within the visual environment. All three sites would be visible from nearby local roads. However, due to their remote locations, potential viewers along these roads will be primarily limited to vehicle occupants accessing the small number of residential properties.

It may be possible for the pumping station and balancing storage located adjacent to Stiller Bros Road to be viewed from residential properties located 1.5 km to the southwest and 2.5 km to the northeast. These views would be partially obstructed by the existing vegetation located around the residential properties and along Stiller Bros Road.

In summary, visual impacts during to the construction and operation phase of the pipeline are likely to be limited to areas in close proximity of construction activities and the locations of above ground infrastructure. These impacts are likely to be minor due to being situated in isolated locations, limited sensitive receptors, the mobile nature of pipe laying, the speed of passing vehicles and the presence of other nearby visual features such as undulating terrain, roads, townships and vegetation.

5.4.2.2. Mitigation measures

Construction and operational mitigation measures recommended to minimise the potential visual impact for the pipeline are as follows:

- minimise the width of the construction corridor which would limit the area to be disturbed or cleared;
- protect native vegetation within other construction areas with particular emphasis on conserving vegetation surrounding the infrastructure;
- re-vegetate areas disturbed by construction activities that do not require ongoing clearing for access purposes; and
- vegetative screening around visually prominent structures, such as the pumping stations and balancing storages, if required.

5.4.3. Associated infrastructure

5.4.3.1. Potential impacts

Impacts to visual amenity as a result of associated infrastructure would be minor due to the temporary nature of construction and the subsequent rehabilitation of disturbed areas once construction is finished.

The construction of realigned local roads and a dam access road with associated small bridges, culverts, fences and cattle grids, would result in changes to landscape character and visual amenity. These changes would be minor, localised in nature and in keeping with the existing environment. Support sites, such as lay down areas, would also be appropriately rehabilitated once construction has been completed.

Infrastructure, such as electricity and telecommunications, would be required to provide service to the dam and pump stations. The installation of telephone, data and fibre optic cables would occur as part of the construction works and would be located within the pipeline trench or located as new overhead powerlines. This necessary infrastructure is proposed to run parallel to the dam access road.

Construction camps and resource extraction sites would temporarily impact on the visual amenity of the surrounding areas, with the view of machinery, stockpiles and vegetation clearing. Camps and laydown areas would generally be located away from public access or viewsheds. The sites would be appropriately decommissioned and rehabilitated following construction with the exception that Council may wish to continue use of some of the accommodation infrastructure.

Recreation areas would be located on the southern side of the “Bend” and on the left bank at the termination of Glebe Weir Road at Boggomoss Creek. A viewing platform would be provided at the dam. While these facilities would be visible to people using or accessing them, views from other locations would be unlikely.

5.4.3.2. Mitigation measures

The mitigation measures are to be implemented to minimise the potential visual impacts resulting from construction and operation of the associated infrastructure mirror those for the dam and pipeline.

5.4.4. Impact assessment and residual risks

The methodology used for risk assessment and management is discussed in Section 1.8.

This section assesses the risks relevant to landscape character and visual amenity and summarises the mitigation measures proposed to minimise those risks.

Table 5-4 presents the risk assessment for the Project as described in Chapter 2, in which SunWater has already incorporated a range of risk reduction and mitigation measures. Table 5-4 also presents the residual risks with additional mitigation measures in place.

Based on this assessment, the following conclusions have been made:

- as the dam construction site would be closed to the public, potential opportunities to view the construction activities would be limited. Views of the water storage area once operational would be generally enjoyed by visitors to the area using the recreational facilities and the residents of the Taroom township;
- visual impacts during to the construction and operation phase of the pipeline are likely to be limited to areas in close proximity of construction activities and the locations of above ground infrastructure. These impacts are likely to be minor due to being situated in isolated locations, limited sensitive receptors, the mobile nature of pipe laying, the speed of passing vehicles and the presence of other nearby visual features such as undulating terrain, roads, townships and vegetation.
- changes in landforms through construction of the associated infrastructure would be remediated by land contouring and rehabilitation of the areas; and
- any negative impacts relevant to landscape character and visual amenity can be effectively managed and the residual risks are acceptable.

Table 5-4 Risk assessment results

Hazards	Factors	Impacts	Project description controls and standard industry practice	Risk with Controls			Additional mitigation measures	Mitigation effectiveness	Residual risk		
				C	L	Current risk			C	L	Mitigated risk
Change in landforms and landscape character.	Creation and construction of the dam and other infrastructure	Landscape character will change with the construction of the dam and water storage. It will also alter as a result of the pipeline and associated infrastructure.	While the presence of these landform features is unavoidable, the creation of a water body not usually associated with the area will benefit the area.	Minor	Absolute	Medium			Minor	Absolute	Medium
		Dam is a large single structure in a natural surrounding and finished form of the abutments is unnatural. Visibility of these features would be unlikely.	Rehabilitation and landscaping to soften edges and shield some of the infrastructure items								

Hazards	Factors	Impacts	Project description controls and standard industry practice	Risk with Controls			Additional mitigation measures	Mitigation effectiveness	Residual risk		
				C	L	Current risk			C	L	Mitigated risk
Change in amenity of the landscape.	Establishment of the dam, water storage area, balancing storages and pipeline aboveground infrastructure will alter the local views.	Change in views on landscape with construction of dam.	The isolation of the sites, the surrounding landforms and vegetation limit the visual presence. Re-vegetation, rehabilitation and land contouring.	Minor	Possible	Medium			Minor	Possible	Medium

5.4.5. Cumulative risk

There are no cumulative risks associated with landscape character and visual amenity of the Project as Nathan Dam will be remote and largely contained within a relatively closed valley surrounded by sloping terrain. Furthermore, the pipeline will be located mostly underground, apart from sections traversing the Great Dividing Range, and will not alter the visual amenity of the local area or the region. A negligible temporary visual impact will occur during the construction period. There may also be periods where the construction of the pipeline coincides with construction of other pipeline projects in the area and impacts from the overlap of these projects would be minor and temporary in nature.

SunWater will consult with the proponents for other pipelines regarding the locations of their above ground infrastructure such that the detailed design can be modified, by either party, to avoid or reduce any coincidental cumulative impacts. Gas pipelines generally have much less above ground infrastructure than water pipelines.

5.5. Summary

The visual catchment of Nathan Dam is remote and largely contained within a relatively closed valley surrounded by sloping terrain. Access to this area is limited and there are currently few visually sensitive receptors.

The visual impact in the immediate vicinity of the dam water storage area during construction would be limited as there is limited public access to the area. However, there would be visual impacts during operation when residents within Taroom and recreational visitors would be able to view the dam and the inundation area. For recreational visitors, the view of the dam and inundation area would be considered to be a positive experience. The addition of water as a visual element and its association with the surrounding land and topography is likely to increase the visual amenity of the catchment from a visitor's perspective.

Views would be restricted from the ridgelines and slopes surrounding the dam and water storage due to limited access. There are also only a small number of residential dwellings located within these areas.

The changes to the landscape character and visual amenity of the surrounding catchment are limited as the construction and operational impacts are mostly confined to the dam and water storage area. Overall, the visual impact from the other infrastructure associated with the Project is considered minor.

The impacts of more prominent features of the above ground pipeline infrastructure would benefit from vegetation screening. However, pipeline features on private property or near trafficable areas would benefit from being visible from a safety and security perspective.