Photo 278

Photo 279

Photo 280

Photo 281

Photo 282

Photo 283

Photo 284

Photo 285

Photo 286

Photo 287

Photo 288

Photo 289

Photo 290

Photo 291

Photo 292

Photo 293

Photo 294

Photo 295

Photo 296

Photo 297

Photo 298

Photo 299

Photo 300

Photo 301

Photo 302

Photo 303

Photo 304

Photo 305

Photo 306

Photo 307

Photo 308

Downstream from here the drain is wide and shallow and full of water (Photo 309) because it has been blocked with fill (Photo 310 and Photo 311). The end of this reach is defined by another major access track with a 600mm pipe under (Photo 312).

From this point the flow is directed immediately north (Photo 313) and then along a well-defined, shallow drain (Photo 314) before diverting south around a large area of fill (Photo 315 and Photo 316). This whole length is unobstructed by crossings (Photo 317) until it is crossed by another farm access track with two 300mm pipes (Photo 318). From here it continues as a wide, shallow drain which is generally unobstructed (Photo 319) before it has to divert south around what appears to be a stockpile of topsoil (Photo 320) and under a farm access through a 300mm diameter pipe (Photo 321).

Downstream of the access track the channel is narrower and appears to be silting up (Photo 322 and Photo 323). Towards the end of this reach there is a 900mm diameter pipe (Photo 324) which diverts the flow north into a pond (Photo 325), the outlet of which is a vegetated spillway channel (Photo 326) heading east and under an access road (Photo 327).

From here the drain is diverted north and then east in a cleared channel (Photo 328) which becomes wider, shallower and more silted downstream (Photo 329). The drain is then a less well defined grassed depression through a paddock (Photo 330) before draining into an area of water which appears to be permanently ponded behind a raised access road embankment (Photo 331). The invert of the 450mm pipe under the access road was above the bed of the pond (Photo 332) and so there was no outflow on the day of the inspection.

Downstream of the access road the channel is wide and deep but initially littered with large woody debris (Photo 333). Water was ponded in this reach because the pipe under the next access road has its invert above the invert of the channel (Photo 334). There appears to be permanent pump infrastructure to extract water from this pond (Photo 335). Recent earthworks downstream of this outlet appears to force water to pond and overflow the access road (Photo 336 and Photo 337) before following the lowest part of the landscape along the toe of a steep batter of fill (Photo 338). This leads to another pond which appears to be used for water supply (Photo 339). No outlet or spillway for this pond was observed so it must simply overflow across the lowest point of the access track at the eastern end of the pond.

Past this access track there was no well-defined channel (Photo 340) until a pond was reached (Photo 341). The overflow from this is a shallow channel (Photo 342) which flows through a pipe under an access road (Photo 343) the continues as a cleared, shallow channel until it enters a thicket of trees (mostly Honey Locust). Here is turns sharply south and enters the river but its condition was not observed because of the thickets of thorny weeds (Honey Locust) which prevented access (Photo 344).

Photo 309

Photo 310

Photo 311

Photo 312

Photo 313

Photo 314

Photo 315

Photo 316

Photo 317

Photo 318

Photo 319

Photo 320

Photo 321

Photo 322

Photo 323

Photo 324

Photo 325

Photo 326

Photo 327

Photo 328

Photo 329

Photo 330

Photo 331

Photo 332

Photo 333

Photo 334

Photo 335

Photo 336

Photo 337

Photo 338

Photo 339

Photo 340

Photo 341

Photo 342

Photo 343

Photo 344

12.1.2 Possible solutions

a) IA3N

While the condition of drains and their crossings throughout this area is not ideal, most of the drainage constrictions would only affect low flow conditions as the last of the water is draining. Hibberts Lane and Gorricks Lane are not significantly higher than the adjacent paddocks and would therefore not slow drainage substantially. There are some access roads which are higher than the floodplain and which might inhibit flow but there was no evidence of damage to turf on paddocks upstream of these caused by them being submerged for prolonged periods of time. There is no urgent need for works in this part of the network for drainage improvements.

b) IA3S

The property subdivision in this area results in long narrow lots which run perpendicular across the drain. This means that actions that a property owner takes that affects the drain on their own property can have implications for the drainage on properties upstream and downstream, sometimes beyond the immediately neighbouring property.

It is not the intention of this report to discuss the legalities or otherwise of fill placement on properties, agricultural practices or engineering design of crossings. What can be said is that the multiple crossings of the drain, the inconsistent channel and pipe sizes, the multiple diversions of the channel direction and the sediment in the channel from the dumping, slumping or erosion of fill or the erosion of paddocks all slow the drainage of water along this drainage path.

However, apart from the road embankment at the upper end of the drain which had no pipe under it (Photo 345), there was no evidence that the various contributors to the slowing of the drainage have caused any noticeable incremental damage. This is because most of the crossings (other than the aforementioned one) are not much higher than the top of the channel and so the channel itself is mostly only draining the remnants of the flood waters which have not drained freely overland.

The damage caused to the two upstream properties from the aforementioned road embankment are extensive because the embankments stands a couple of metres higher than the floodplain and it has not pipe outlet through it. It effectively forms a porous (leaky) dam across that part of the floodplain and when it gets filled with water overflowing from the Hawkesbury River it can take a long time to drain.

The most effective way of reducing the volume of detained water and the duration it is detained is to lower the profile of the embankment to as low as practicable above the invert of the drain and to install a pipe through the embankment with an invert at the invert level of the drain. This will have some technical challenges at this location because the drainage channel immediately downstream of the access track has been moved from its original alignment. This can be seen by comparing an airphoto from November 2017 (Figure 106) with one from October 2021 (Figure 107).

In 2017 the drain downstream of the damming access road was aligned with the sections of drain upstream and downstream and was a wide pond of water similar to downstream. By 2021 the original drain alignment had been filled in and the drain made narrower and shifted about 15m north. This will mean that any pipe under the road will need to be laid diagonally across the road rather than perpendicular across the road. This will increase its length and the cost of laying it.

Possible solutions for IA3S are shown in Figure 108.

Photo 345

Figure 106: 2017 drain alignment

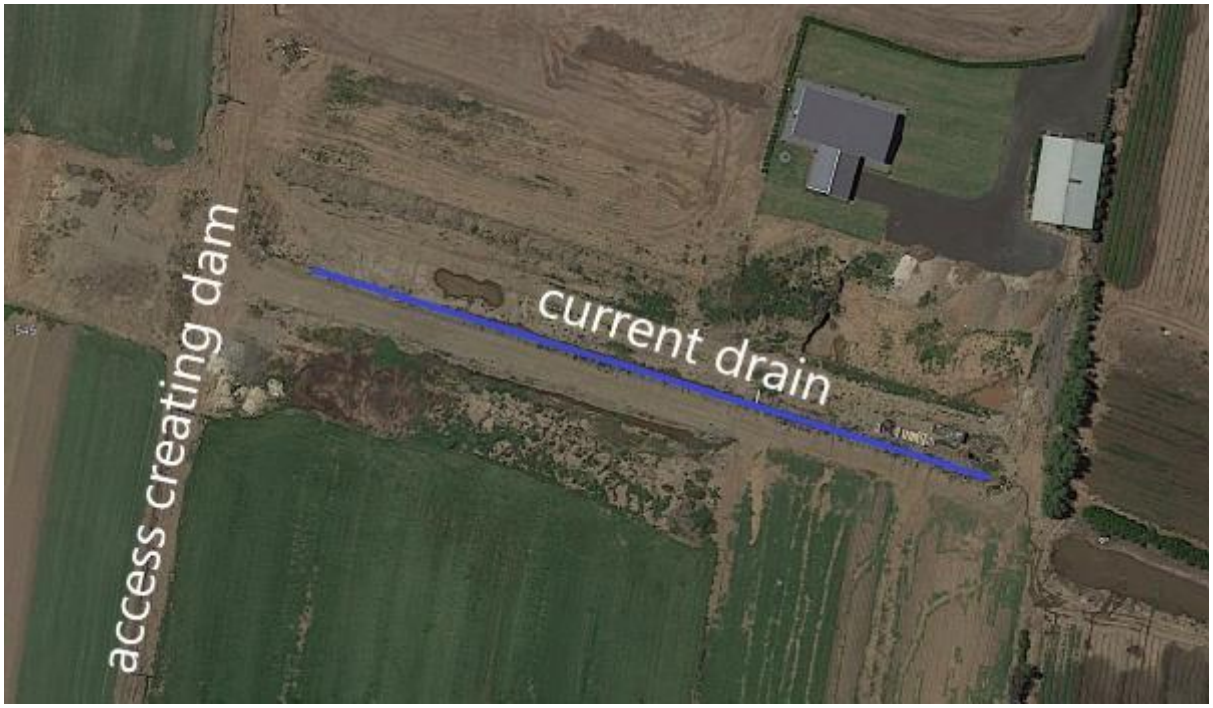


Figure 107: 2021 drain alignment

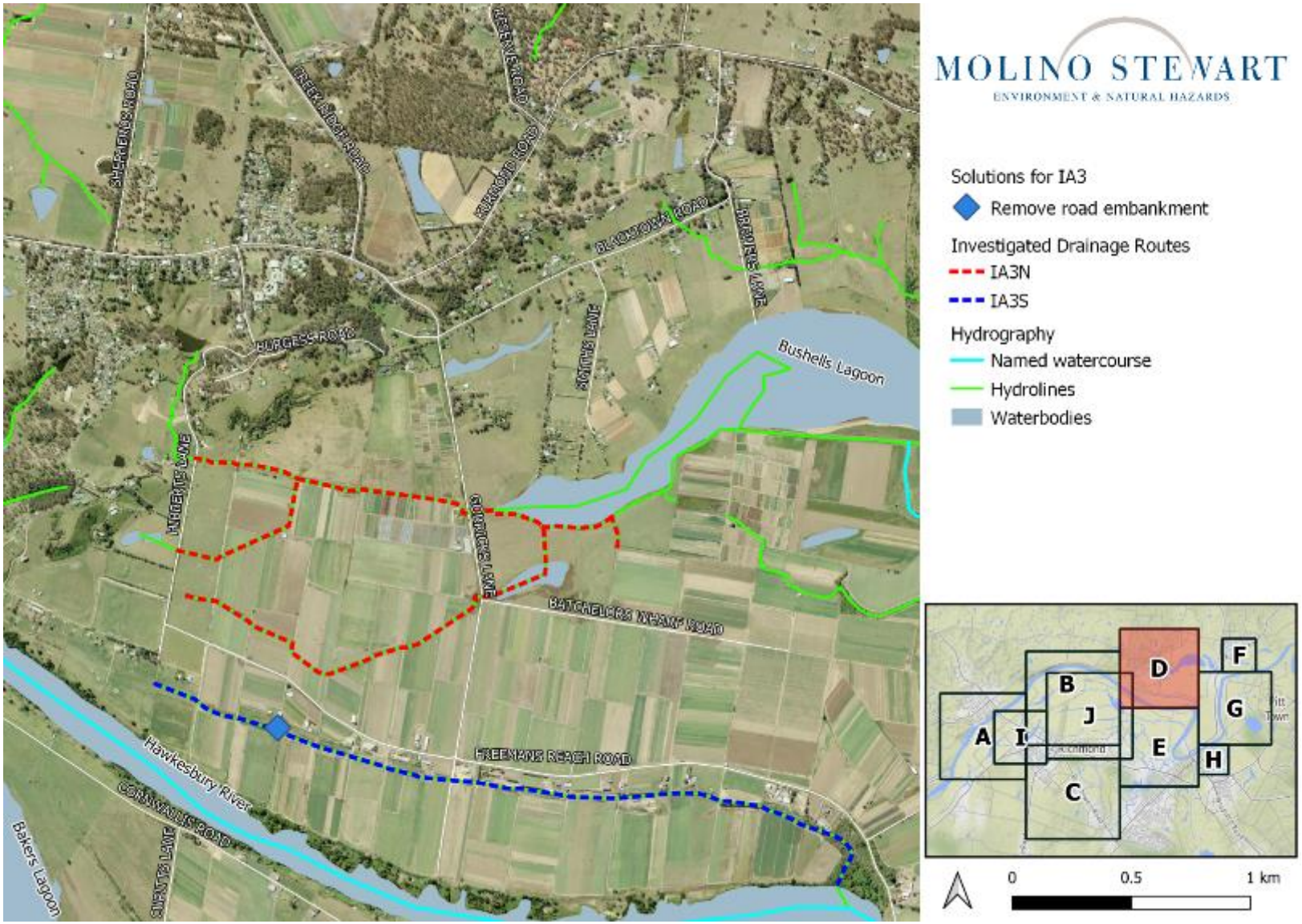


Figure 108: Solutions for IA3

12.2 Environmental Constraints

a) Zoning

The drainage network in Investigation Area 3 predominantly traverses land zoned as RU2 – Rural Landscape with the single exception being Bushells Lagoon which is zoned as C2 – Environmental Conservation, into which the drainage network enters in the northeast, east of Gorricks Lane (Figure 109).

Maintenance of existing drainage channels is permitted without consent for zones RU2 and C2, while reinstating or rectifying drainage lines requires development consent. Removing a road embankment would be considered rectifying a drainage line, therefore the suggested solution would be subject to development approval.

b) Contamination

Notified contaminated sites on or near the Hawkesbury Floodplain are shown in Figure 4.

There are no contaminated sites within the vicinity of the Investigation Area 3 drainage network.

c) Acid Sulphate Soils

The Investigation Area 3 drainage is surrounded by Class 4 and 5 land on the HLEP Acid Sulphate Soils Map (Figure 110). Majority of the drainage channel is surrounding by Class 4 land with the exception of a small segment of drainage channel in the northwest, around Hibberts Lane, which is surrounded by Class 5 land.

According to the HLEP 2012 Part 6.1, development consent in Class 4 land is required for works more than 2m below the natural ground surface or are likely to lower the watertable by more than 2m below the natural ground surface. For Class 5 land development consent is required for works within 500 m of adjacent Class 1, 2, 3 or 4 land that is below 5 m Australian Height Datum and by which the watertable is likely to be lowered below 1 m Australian Height Datum on adjacent Class 1, 2, 3 or 4 land. Development consent cannot be granted unless an ASS management plan has been prepared for the proposed works in accordance with the ASS Manual.

However, development consent is not required if the works involve the disturbance of less than 1 ton of soil or are not likely to lower the water table (*HLEP 2012* Part 6.1 (6)); if a preliminary assessment (prepared in accordance with the ASS Mapping) indicates that an ASS management plan is not required (*HLEP 2012* Part 6.1 (4)); or if works are conducted by a public authority and are either emergency work or routine maintenance work as described in the HLEP Part 6.1 (5).

No works are suggested which would lower the ground level or water table.

d) Heritage

i) HLEP Heritage Items

IA3 traverses three General Heritage Items and is in close proximity to another. IA3N traverses item I348 north of Batchelors Wharf Road and is in close proximity to I345 immediately southeast of the Gorricks Lane - Batchelors Wharf Road intersection (Figure 111). South of Freemans Reach Road, IA3S traverses I345 and I346 and is in close proximity to I347 (Figure 111). The details of these heritage items are shown in Table 8 (*HLEP 2012* Schedule 5).

While sections of drain pass through three of these heritage listed properties, the building are of heritage significance and are at some distance from and higher elevation than, the drains.

Table 8: HLEP Heritage Items (IA3)

Item Number	Item Name	Address	Significance
I345	"Sunny Farm"	435 Freemans Reach Road, Freemans Reach	Local
I346	House and slab barns	375 Freemans Reach Road, Freemans Reach	Local
I347	House and barn	353 Freemans Reach Road, Freemans Reach	Local
I348	"Reibycroft"	32–94 Smiths Lane, Freemans Reach	Local

ii) AHIMS Heritage Items

An AHIMS Basic Search of constraints extent D returned 4 Aboriginal Sites. One site appears to be near IA3S, approximately 400 m east of Gorricks Lane and 400 m south of Freemans Reach Road (Figure 112). However, the exact location and nature of Aboriginal sites is not known from a Basic Search. Therefore, for any works on IA3N or IA3S, a Basic Search of the specific works extent should be conducted to confirm whether any Aboriginal Sites are nearby. If an initial basic search returns any Aboriginal Sites, an AHIMS Extensive Search is required.

e) Wetlands and Coastal Areas

There are two wetlands identified on the HLEP Wetlands Map and in the R&H SEPP along the Investigation Area 3 drainage network. These are Bushells Lagoon and a smaller wetland immediately to the east of Gorricks Lane and to the north of Batchelors Wharf Road (Figure 113). No works are proposed in these areas.

Before development consent can be granted for any works conducted within the extent and proximity area of these wetlands the provisions set out in Part 6.5 (3) and (4) of the HLEP and sections 2.7 and 2.8 of the R&H SEPP must be satisfied. These provisions are quoted in sections 3.5 and 3.6 of this report.

IA3S intersects the coastal environmental area and coastal use area at its lower reaches but no works are proposed in this area. Any works undertaken within the coastal environment area and the coastal use area must follow the provisions set out in sections 2.10 and 2.11 of the R&H SEPP respectively.

f) Ecology

i) PCT Mapping

There are two PCTs mapped along the IA3 Drainage Network; these are PCT 781 and PCT 835 (Figure 114). PCT 781 is mapped for the waterbodies to the east of Gorricks Lane and north of Batchelors Wharf Road. PCT 835 is mapped along the final 250m (approximately) of the drainage channel south of Freemans Reach Road, around its outlet into the Hawkesbury River. Field observations suggest that the area mapped at PCT 835 is an infestation of woody weeds, mostly Honey Locust.

None of the recommended works would impact on these PCTs.

ii) Terrestrial Biodiversity

Figure 115 shows Bushells Lagoon and the smaller wetland to the south to be Significant Vegetation with a buffer area around each being mapped as Connectivity Between Significant Vegetation. The lower reaches of IA3S are mapped as Connectivity Between Significant Vegetation.

iii) Biodiversity Values

As shown in Figure 116, Bushells Lagoon and the adjacent wetland are mapped as 'Biodiversity Value' on the DPE Biodiversity Values Map. No works would be necessary in these areas.

iv) Threatened Species Records

The Grey-headed Flying-fox and the Black Bittern are the two threatened species sighted closest to the IA3 drains but the suggested works would not have an impact on the habitat of either.

v) Key Fish Habitat

According to Figure 118 the only key fish habitat in the vicinity is in the Hawkesbury River.

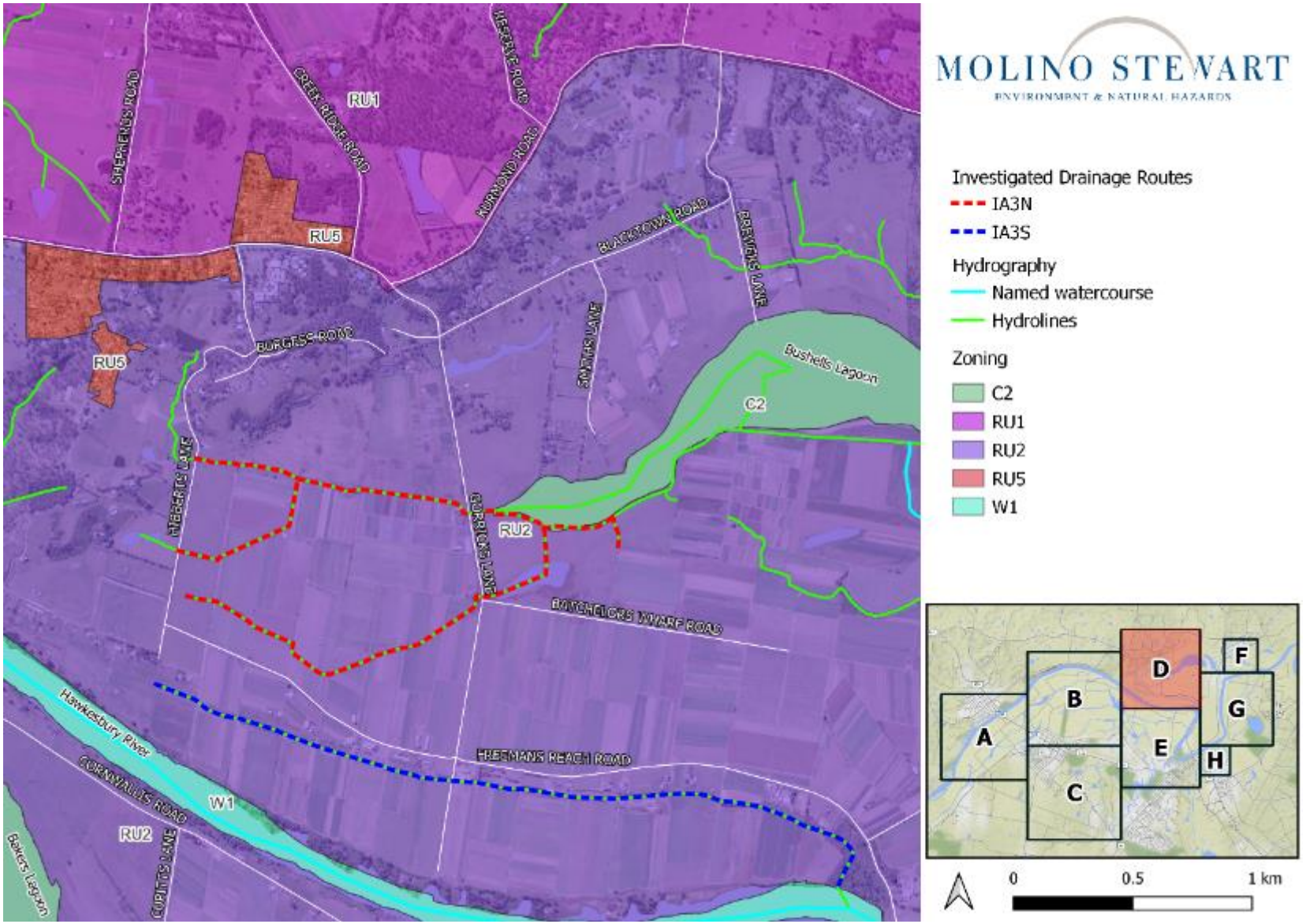


Figure 109: Land Zoning (Extent D)

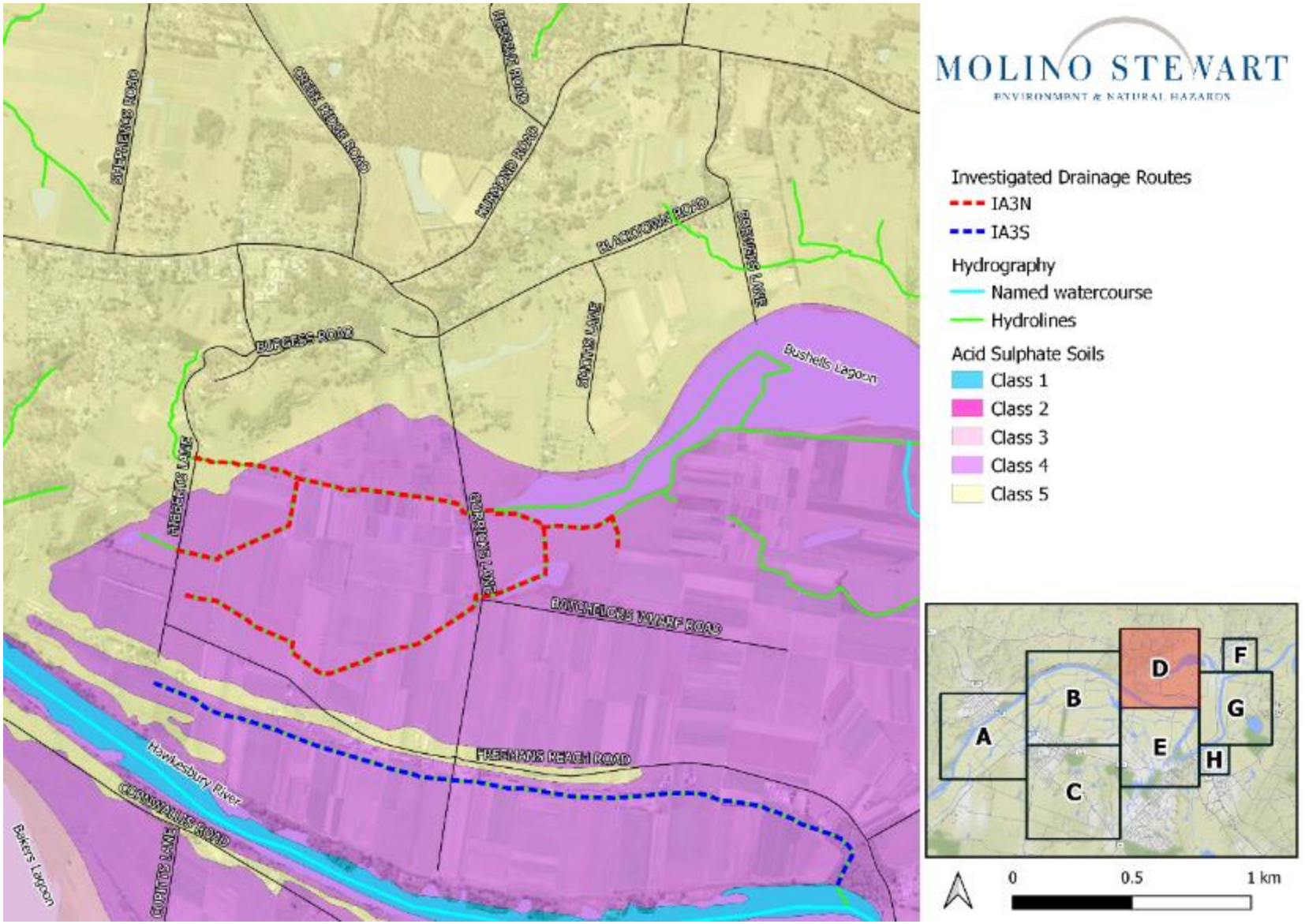


Figure 110: Acid Sulphate Soils (Extent D)

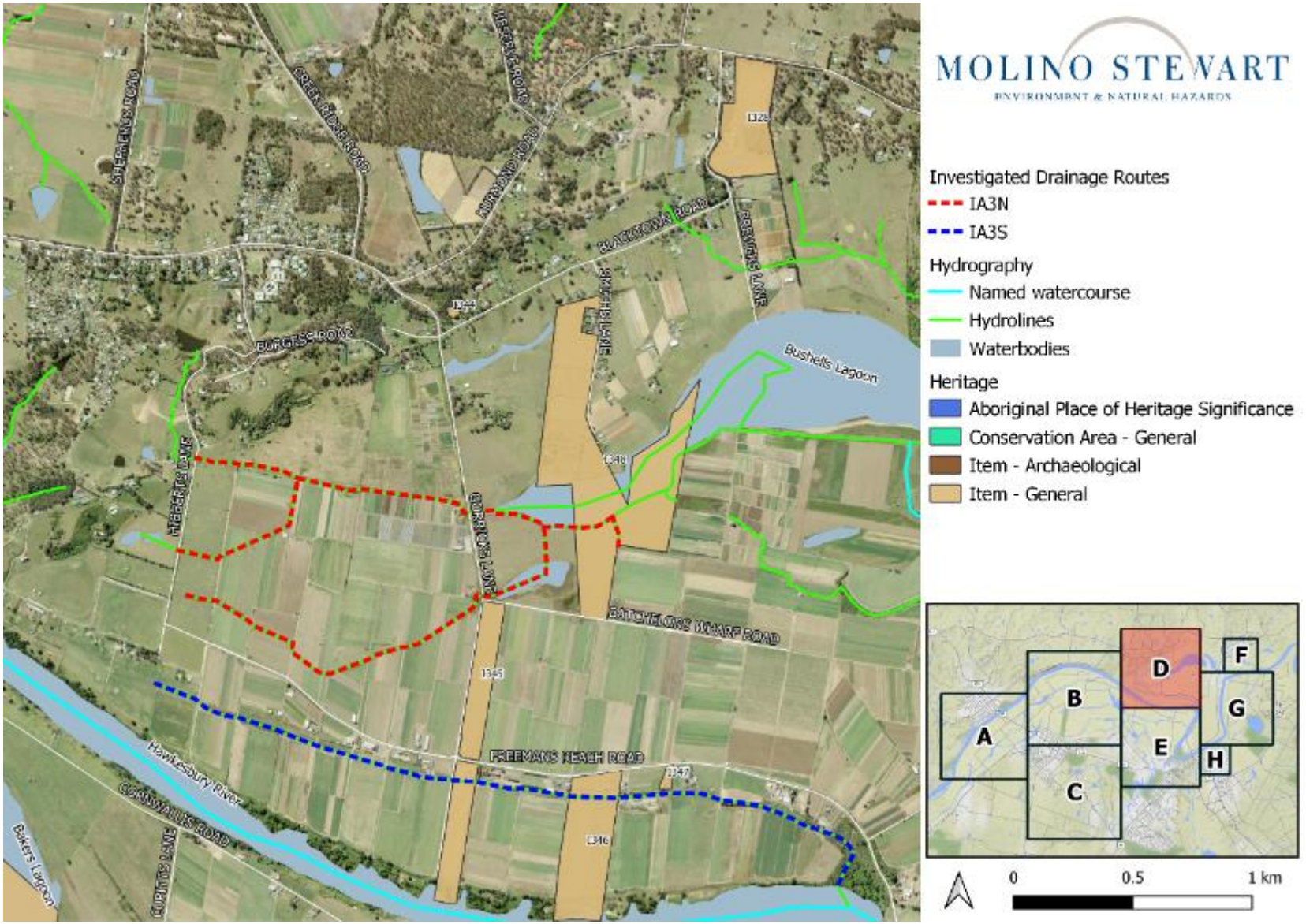


Figure 111: HLEP Heritage Places, Areas and Items (Extent D)

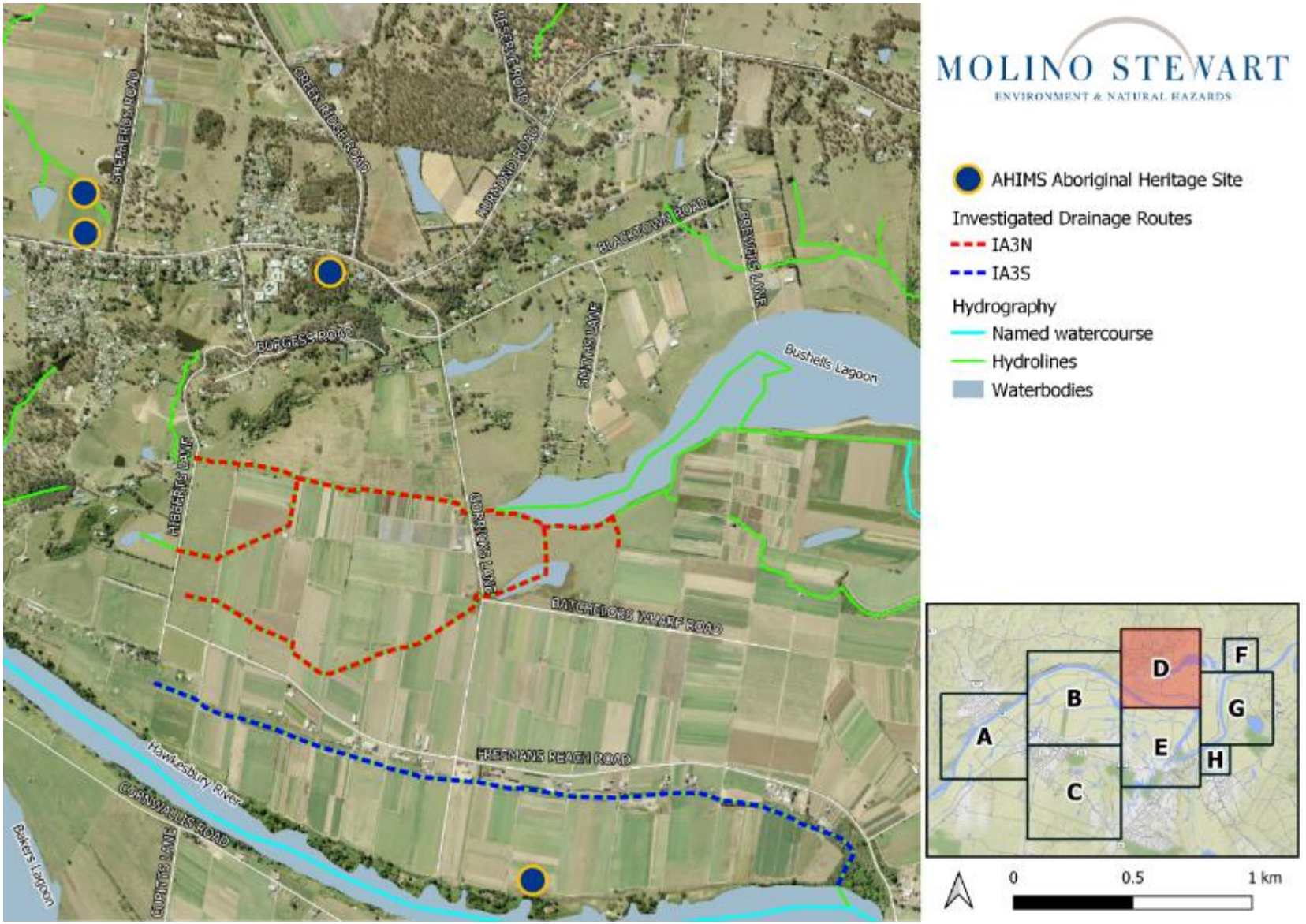


Figure 112: AHIMS Aboriginal Sites (Extent D)

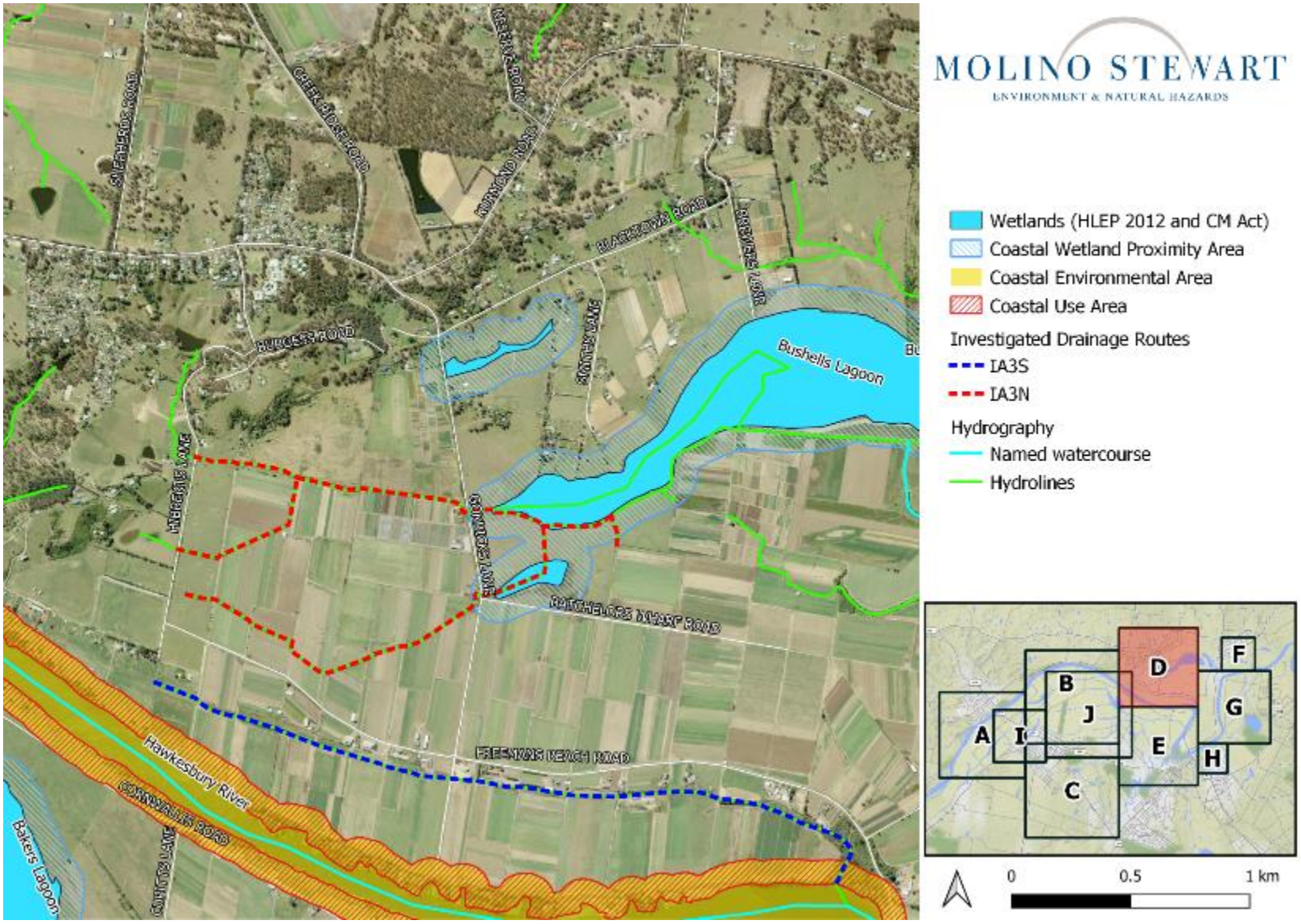


Figure 113: Wetlands and Coastal Management Areas (Extent D)

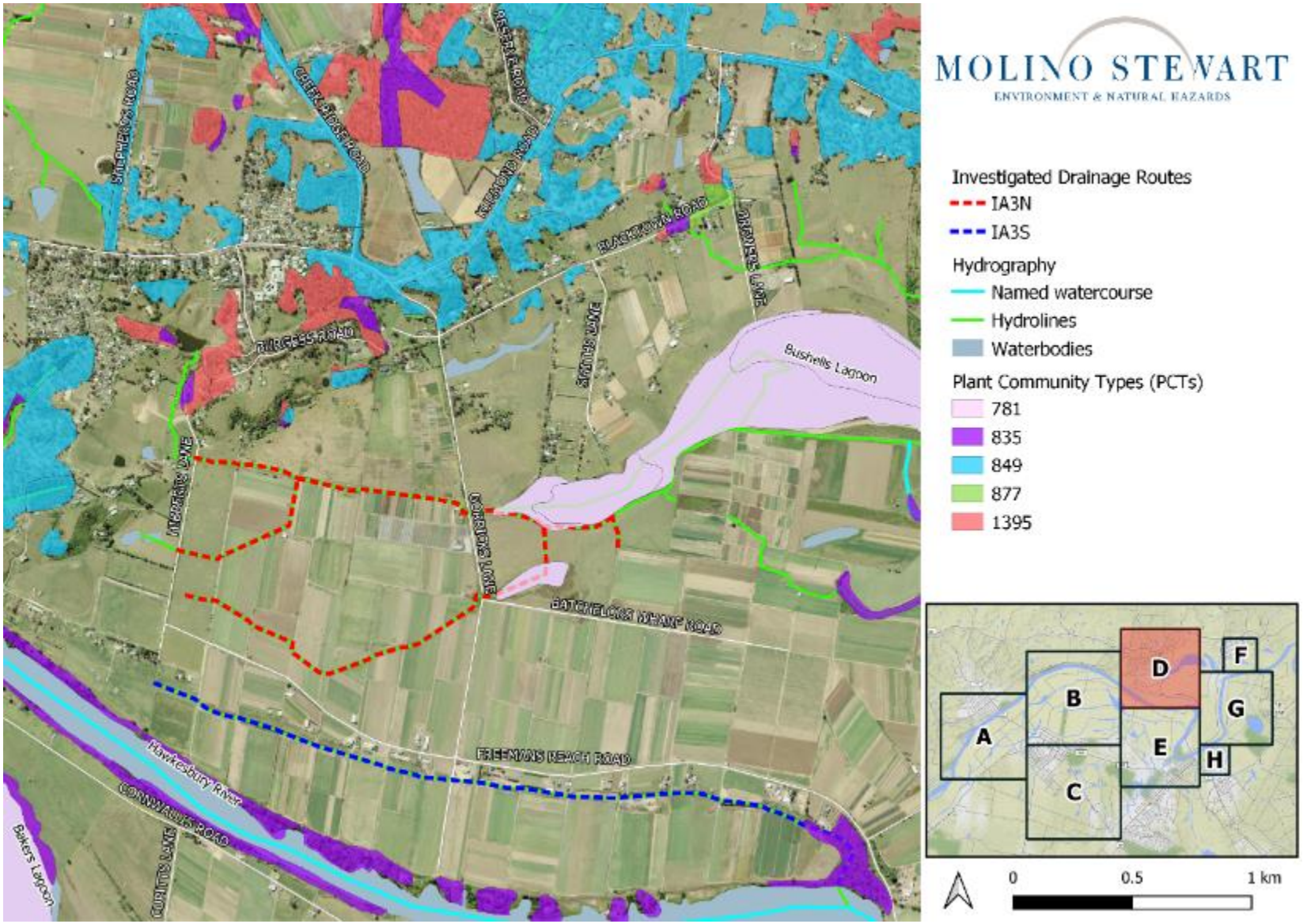


Figure 114: Plant Community Types (Extent D)

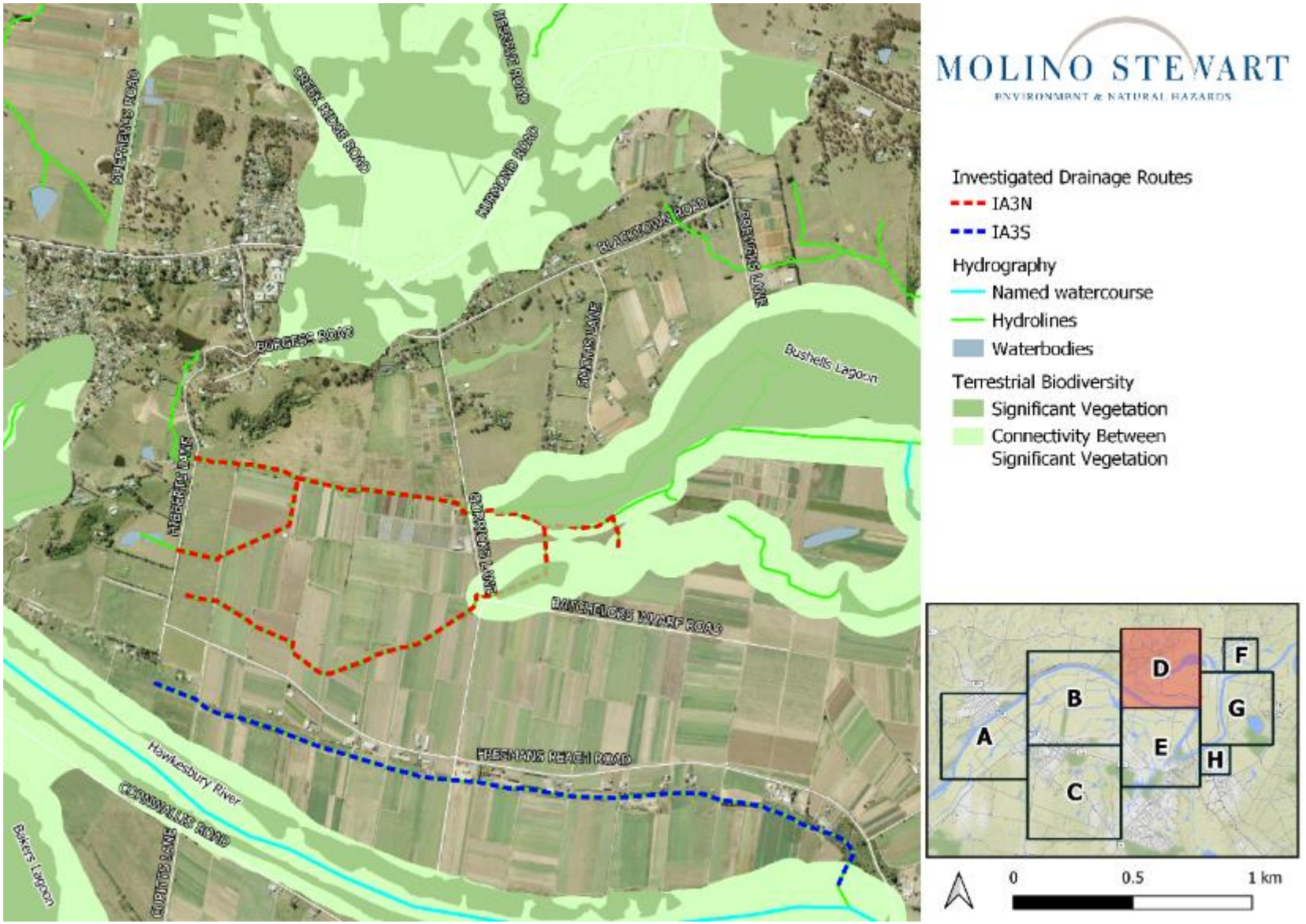


Figure 115: Terrestrial Biodiversity (Extent D)

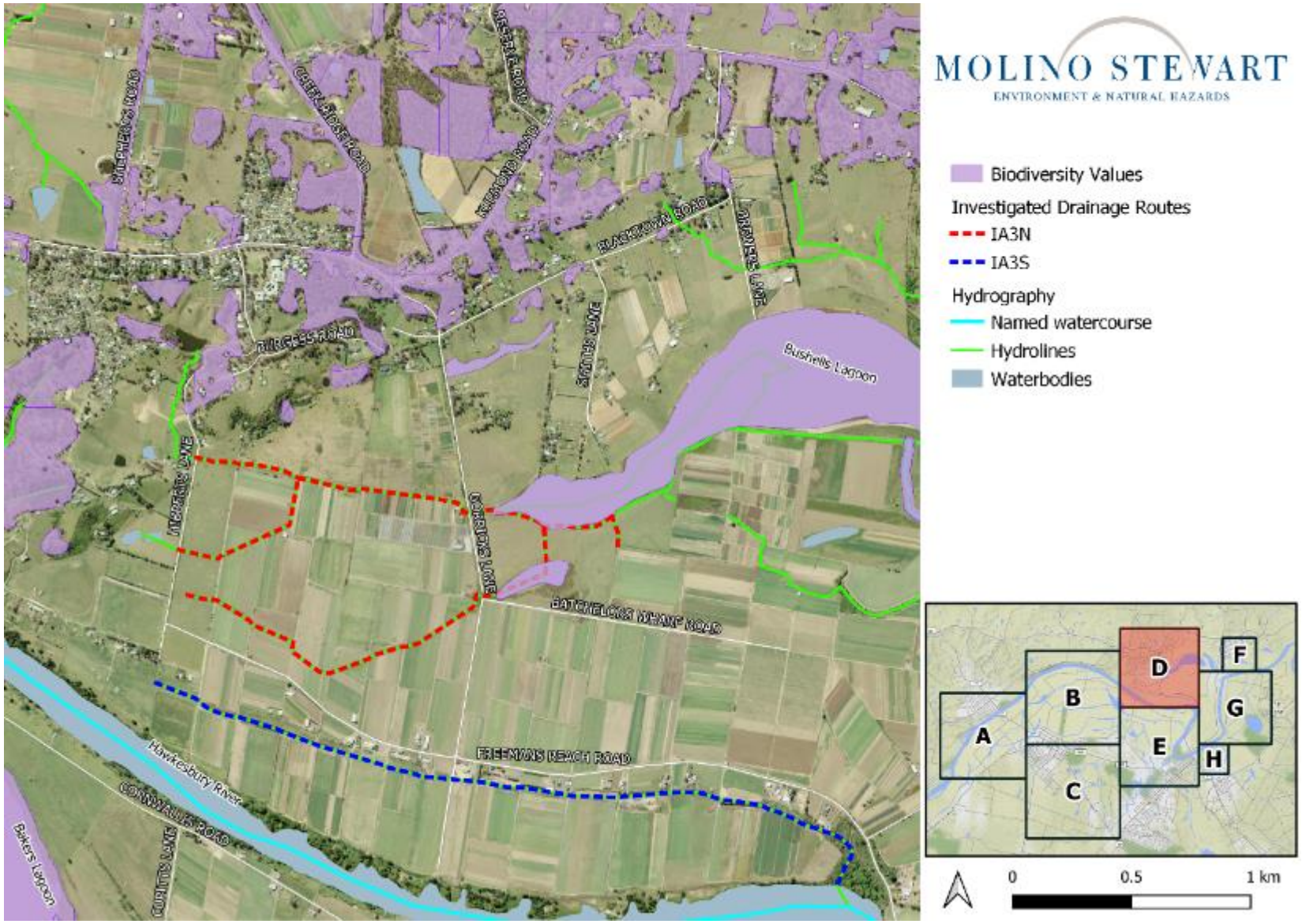


Figure 116: Biodiversity Values (Extent D)

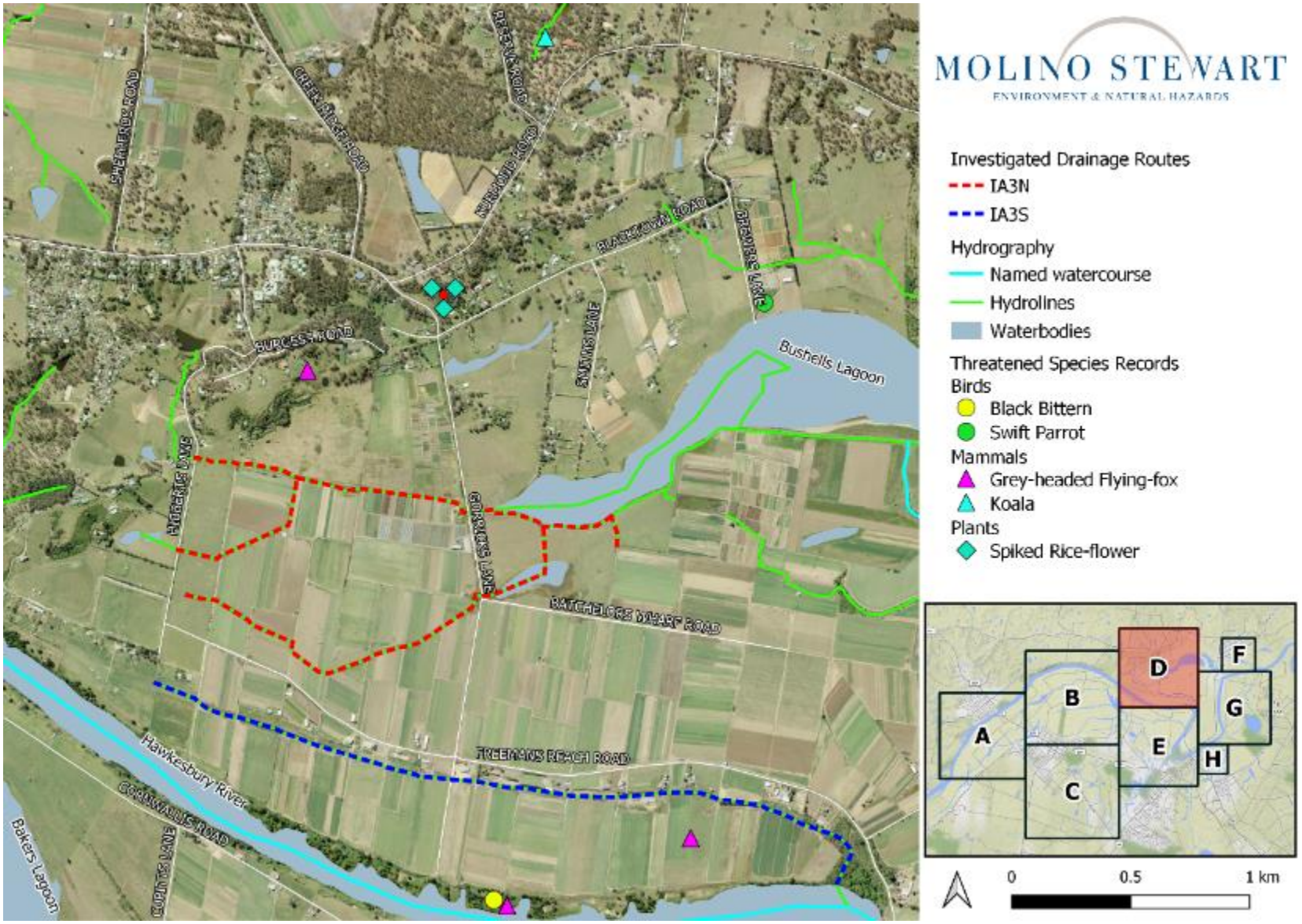


Figure 117: Threatened Species Records (Extent D)

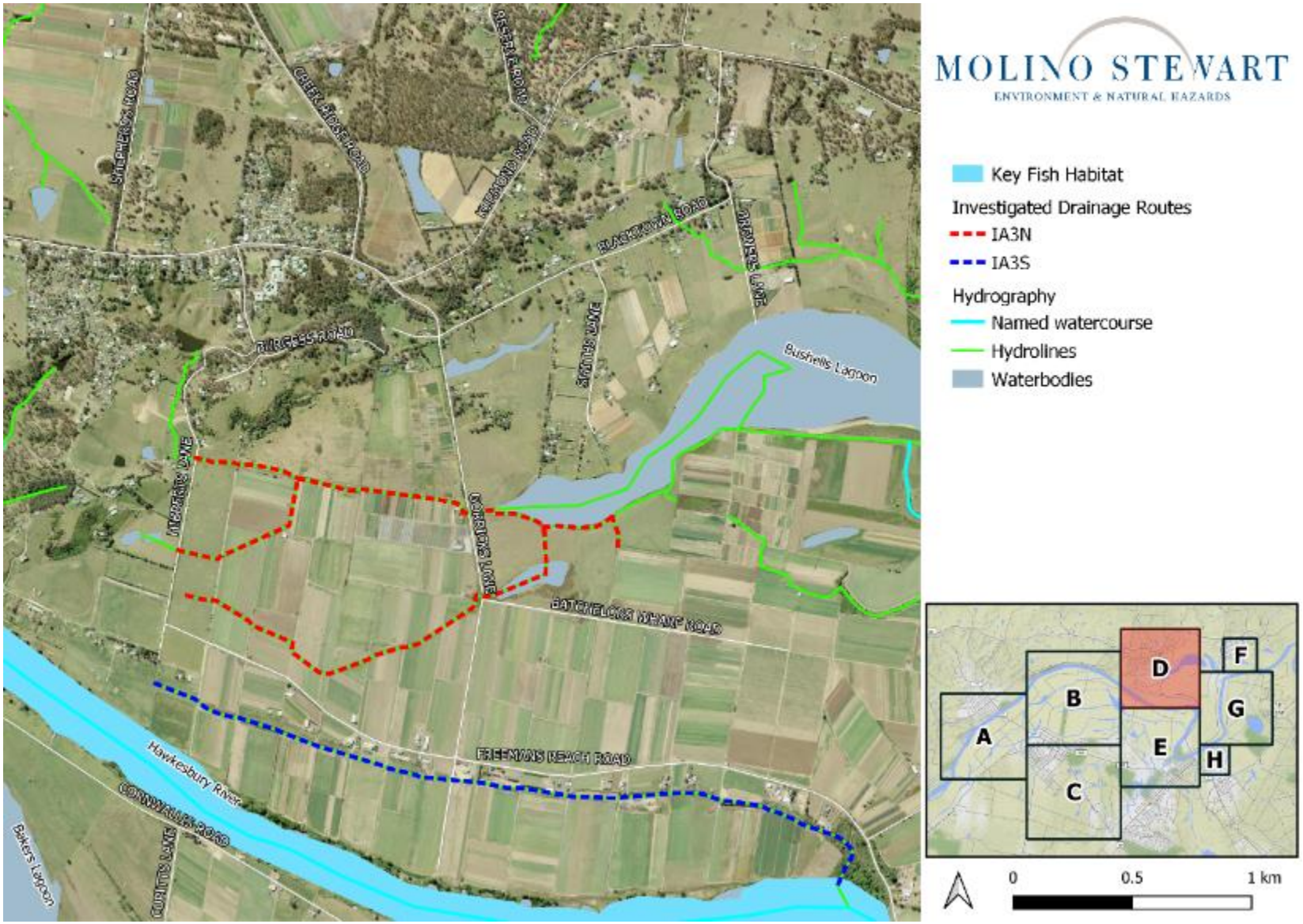


Figure 118: Key Fish Habitat (Extent D)

13| Investigation Area 4

13.1 Drainage Issues

Investigation Area 4 (IA4) is on the northern side of the Hawkesbury River, south of the town of Wilberforce (Figure 119). The locations of each photograph referred to in the text can be found in Figure 120.

13.1.1 Field observations

There are two branches of drainage in this area which commence north of King Road and converge in a complex of wetlands which overflow into a deep drain which discharges into the Hawkesbury River. Where the north eastern arm passes under King Road, the flows coming down the channel (according to a property owner) had caused significant damage to the infrastructure upstream (Photo 346) and downstream (Photo 347) of the culvert. There was also a pollution event in the creek on the day of the inspection and this had been reported to Council. A disused crossing downstream has been torn apart by erosion (Photo 348).

The pipes and drains leading into and out of the wetlands did not appear to be blocked (Photo 349). The wetlands themselves were very full (Photo 350) and the ground surrounding them was saturated but that is to be expected.

The south western drain leading into the wetlands was choked with weeds along its length (Photo 351).

The channel leading out of the wetlands was deep and flowing freely despite thick reed growth along its edges (Photo 352). Once crossing was badly damaged (Photo 353) but this did not appear to be inhibiting flow in the channel at this water level. Further on there were some woody snags (Photo 354).

After the channel turns south towards the river it becomes much deeper and is tree lined in places with some flood debris (Photo 355). Closer to the river there is evidence of bank slumping (Photo 356 and Photo 357).

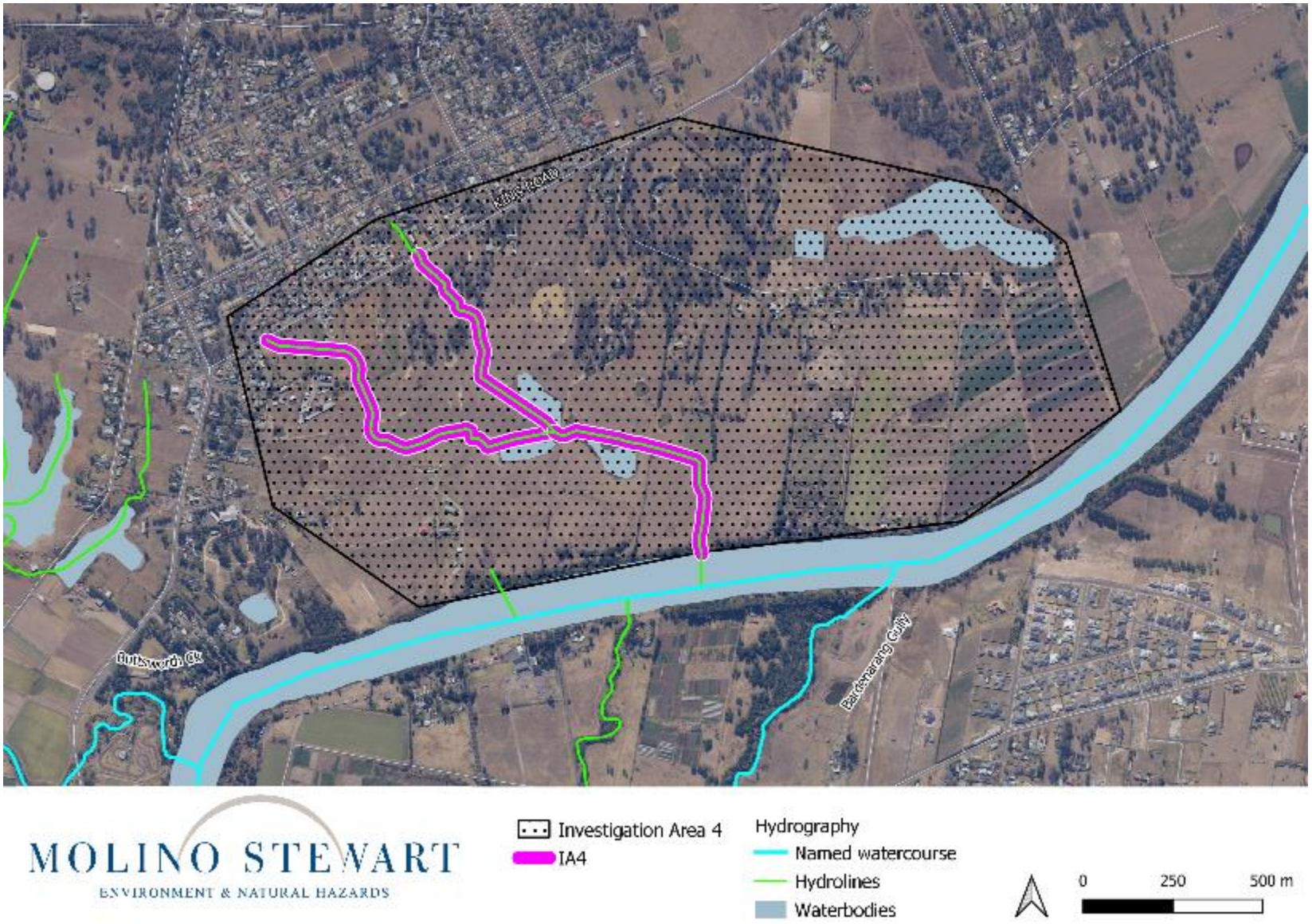
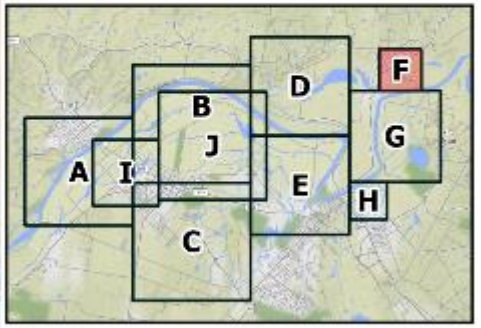


Figure 119: Investigation Area 4 Drainage Route (IA4)

MOLINO STEWART
ENVIRONMENT & NATURAL HAZARDS

Photo locations
Investigated Drainage Routes
IA4
Hydrography
Named watercourse
Hydrolines
Waterbodies



0 250 500 m

Photo 346

Photo 347

Photo 348

Photo 349

Photo 350

Photo 351

Photo 352

Photo 353

Photo 354

Photo 355

Photo 356

Photo 357

13.1.2 Probable causes

As with some of the other investigation areas, IA4 showed no evidence of significant damage caused by inhibited drainage. According to an adjacent landowner, the damage to the infrastructure around King Road occurred when local catchment flows came down the concrete lined channel and overtopped the road, rather than from the river flooding which backup the creek and overtopped the road.

The bank slumping in the lower reaches of the creek is caused by its steep, sparsely vegetated banks in the unconsolidated alluvial sediments which become saturated and then cannot drain fast enough as the river level drops.

13.1.3 Possible solutions

Detailed engineering design will be required to identify how to make the creek crossing at King Road more resilient to high local stormwater flows. This is outside the scope of this report.

While bank slumping could be repaired and mitigated following the principals set out for options to deal with the similar problem in IA1NE, in IA4 there does not appear to be any significant impact caused by the slumping so there is not imperative to undertake works here.

Although this report is not recommending works in IA4 to improve post flood drainage, the following section sets out the environmental constraints in the area to inform other works which might be deemed necessary.

13.2 Environmental Constraints

a) Zoning

The drainage network in Investigation Area 4 predominantly traverses land zoned as RU2 – Rural Landscape with small upstream sections crossing into R2 – Low Density Residential land in the north (Figure 121).

Maintenance of existing drainage channels is permitted without consent for zones RU2 and R2, while reinstating or rectifying drainage lines requires development consent. No drainage enhancement works are expected to be necessary within the R2 land.

b) Contamination

Notified contaminated sites on or near the Hawkesbury Floodplain are shown in Figure 4.

There are no contaminated sites within the vicinity of the Investigation Area 4 drainage network.

c) Acid Sulphate Soils

The Investigation Area 4 drainage network is surrounded by Class 4 and 5 land on the HLEP Acid Sulphate Soils Map (Figure 122). Majority of the drainage network is surrounding by Class 4 land with a segment either side of King Road surrounded by Class 5 land. Other small segments of drainage channel do cross into Class 5 land, however, given their small size, any works pertaining to these segments are likely to encroach into Class 4 land.

According to the HLEP 2012 Part 6.1, development consent in Class 4 land is required for works more than 2m below the natural ground surface or are likely to lower the watertable by more than 2m below the natural ground surface. For Class 5 land development consent is required for works within 500 m of adjacent Class 1, 2, 3 or 4 land that is below 5 m Australian Height Datum and by which the

watertable is likely to be lowered below 1 m Australian Height Datum on adjacent Class 1, 2, 3 or 4 land. Development consent cannot be granted unless an ASS management plan has been prepared for the proposed works in accordance with the ASS Manual.

d) Heritage

i) HLEP Heritage Items

IA4 traverses one General Heritage Item; item I496 immediately south of King Road (Figure 123). The details of this heritage item are shown in Table 9 (*HLEP 2012* Schedule 5).

Table 9: HLEP Heritage Items (IA4)

Item Number	Item Name	Address	Significance
I496	The Butcher's Shop	52 King Road, Wilberforce	Local

ii) AHIMS Heritage Items

An AHIMS Basic Search of constraints extent F returned no Aboriginal Sites near IA4 (Figure 124). However, the exact location and nature of Aboriginal sites is not known from a Basic Search. Therefore, for any works on IA4, a Basic Search of the specific works extent should be conducted to confirm whether any Aboriginal Sites are nearby. If an initial basic search returns any Aboriginal Sites, an AHIMS Extensive Search is required.

e) Wetlands and Coastal Areas

There is one wetland identified on the HLEP Wetlands Map and the R&H SEPP mapping along the IA4 drainage network, located in the middle of the network where the two upstream drainage channels converge (Figure 125).

Before development consent can be granted for any works conducted within the extent of this wetland the provisions set out in Part 6.5 (3) and (4) of the HLEP and sections 2.7 and 2.8 of the R&H SEPP must be satisfied.

IA4 intersects the coastal environmental area and coastal use area at its lower reaches. Any proposed works undertaken within the coastal environment area and the coastal use area must follow the provisions set out in sections 2.10 and 2.11 of the R&H SEPP respectively.

The provisions are quoted in sections 3.5 and 3.6 of this report.

f) Ecology

i) PCT Mapping

There are two PCTs mapped along the IA4 Drainage Network; these are PCT 835 and PCT 877 (Figure 126). PCT 835 is mapped for an approximate 40 m segment of drainage channel, approximately 80 m south of King Road, and for the final approximate 350 m of drainage channel before its outlet into the Hawkesbury River. PCT 877 is mapped for an approximate 10 m of drainage channel approximately 70 m south of King Road. PCT 1395 is mapped within reasonably close vicinity of the drainage channel approximately 70 m and 250 m south of King Road.

ii) Terrestrial Biodiversity

Figure 127 shows the stand of trees immediately to the south of King Road, the wetland and the final 350m of the drainage channel as all being classified as 'Significant Vegetation'.

iii) Biodiversity Values

Approximately 300 m of IA4, at the intersection of the three drainage channels within the wetland complex, is mapped as 'Biodiversity Value' on the DPE Biodiversity Values Map, with two BV areas in close proximity to IA4 in the north (Figure 128).

iv) Threatened Species Records

There have been sightings of the Varied Sittella and the Grey-headed Flying-fox west of IA4 but no threatened species in the vicinity of the channel (Figure 129)

v) Key Fish Habitat

As shown by Figure 130, key fish habitat is confined to the Hawkesbury River in IA4.

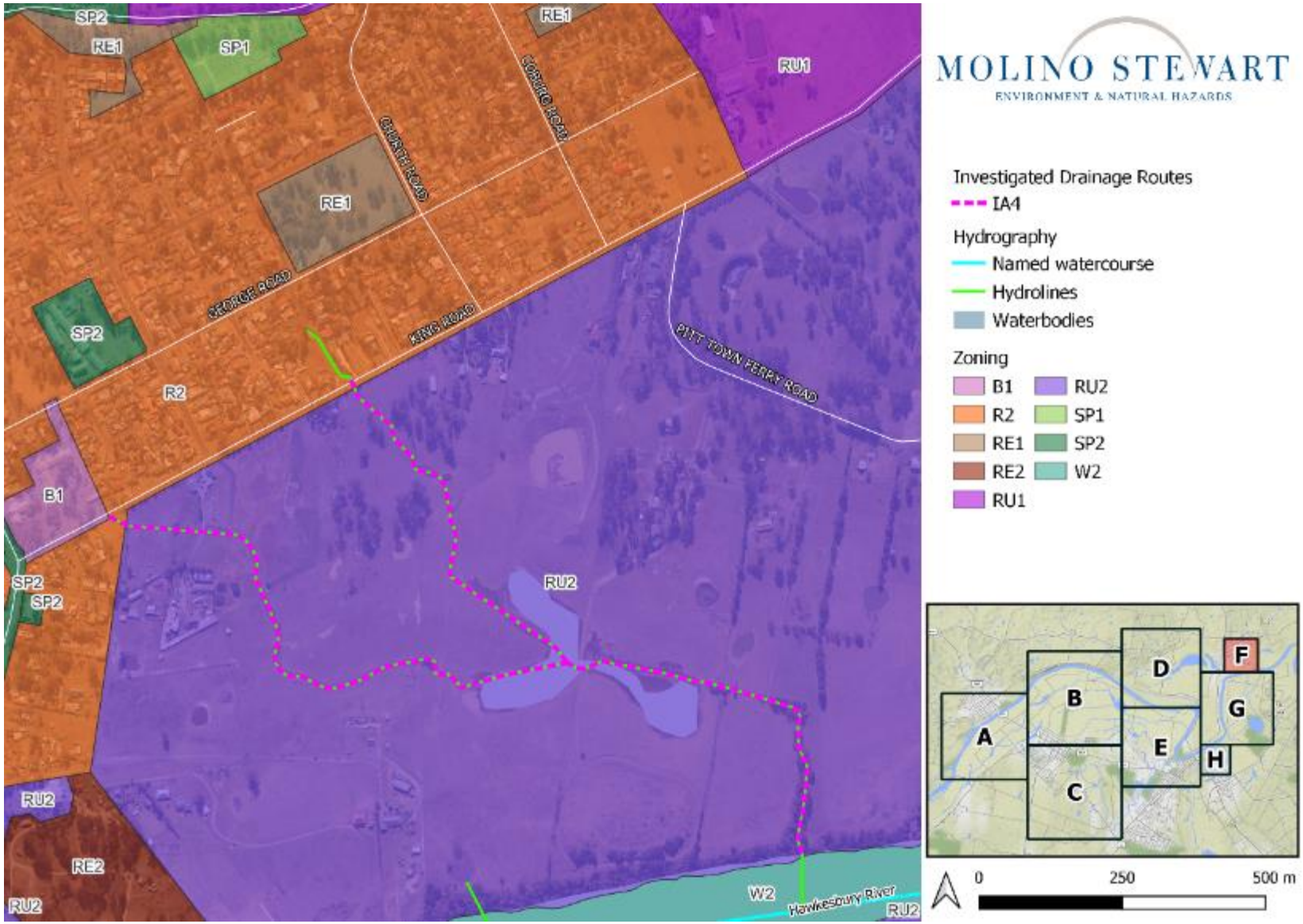


Figure 121: Land zoning (Extent F)

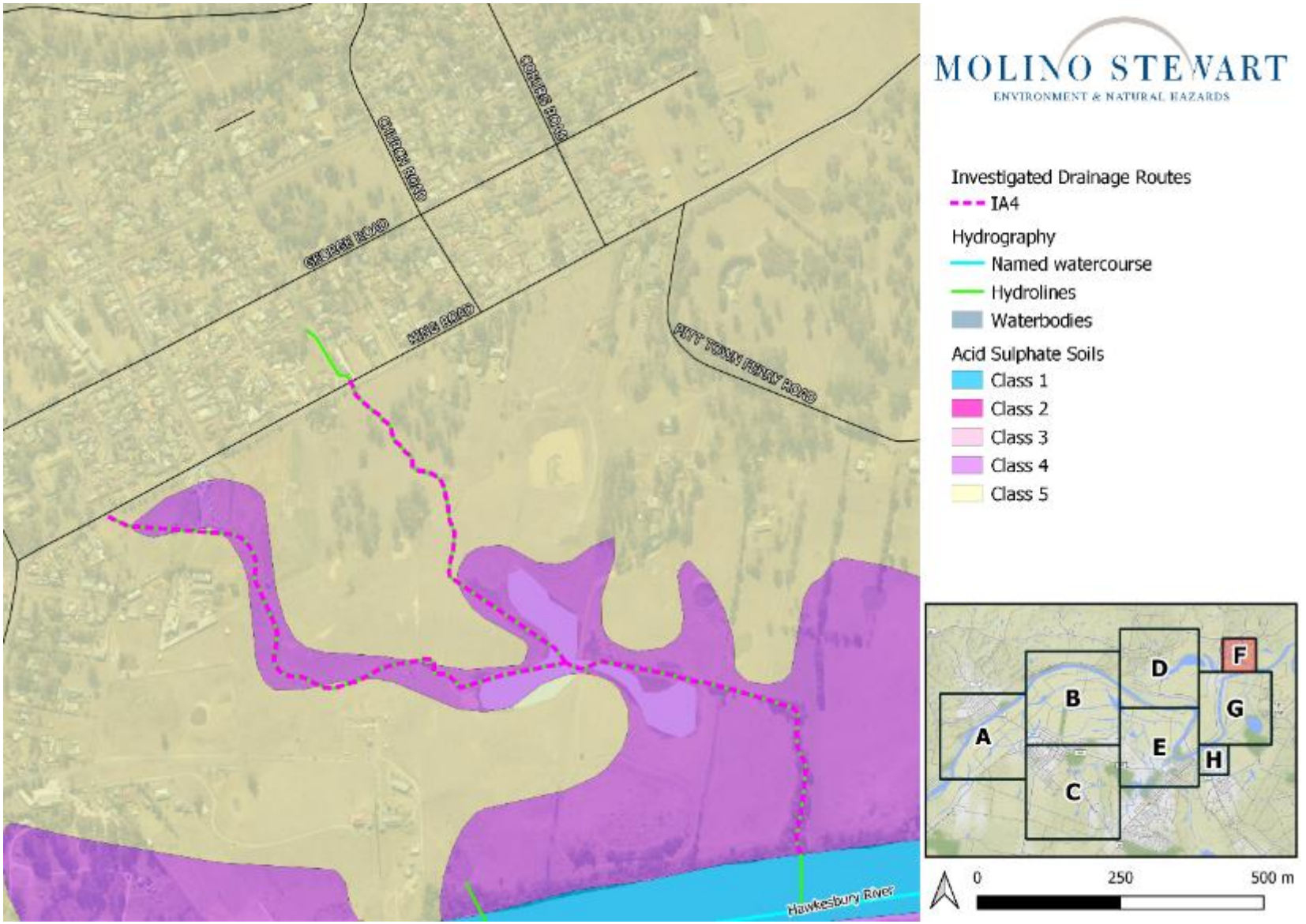


Figure 122: Acid Sulphate Soils (Extent F)

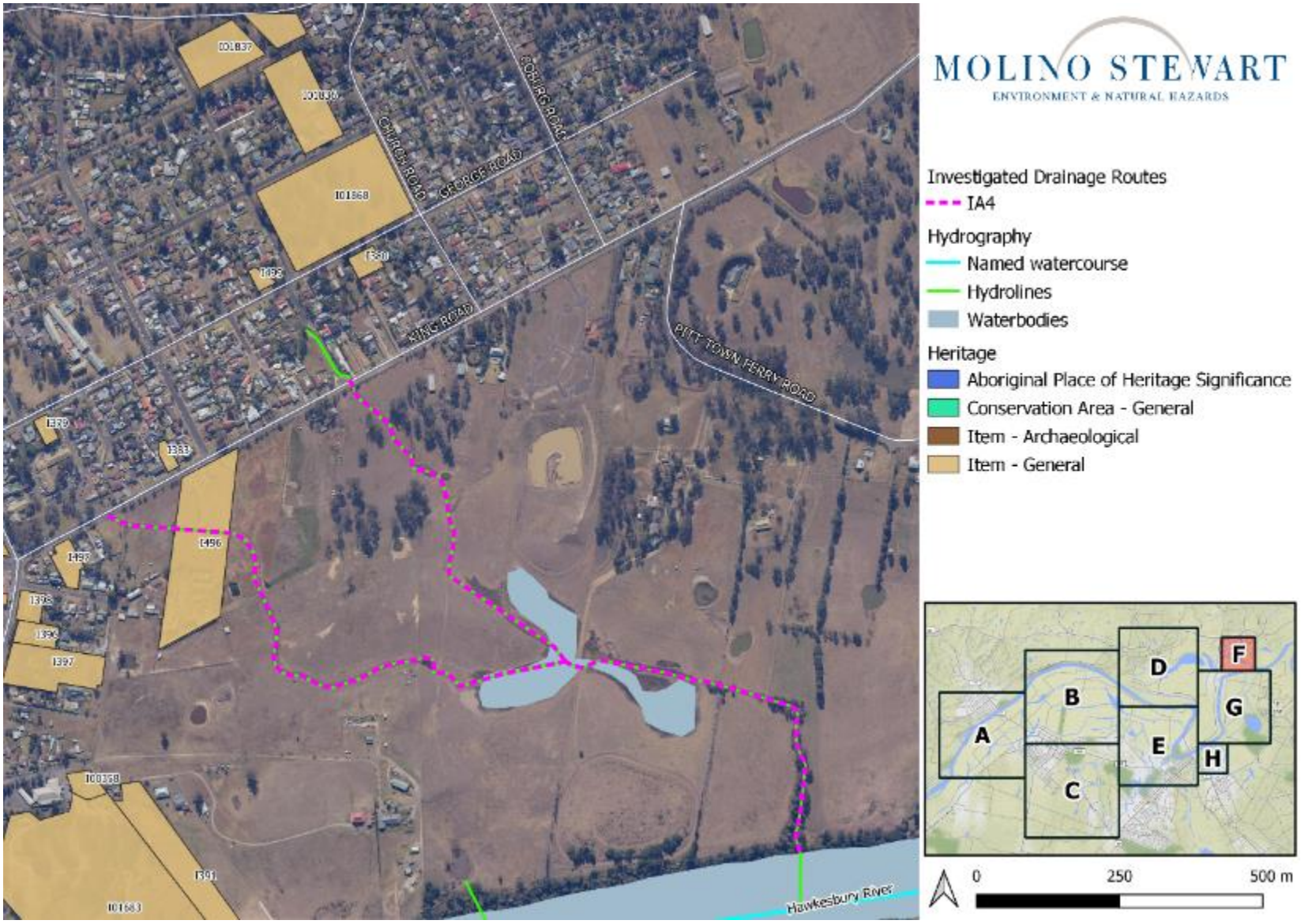


Figure 123: HLEP Heritage Places, Areas and Items (Extent F)

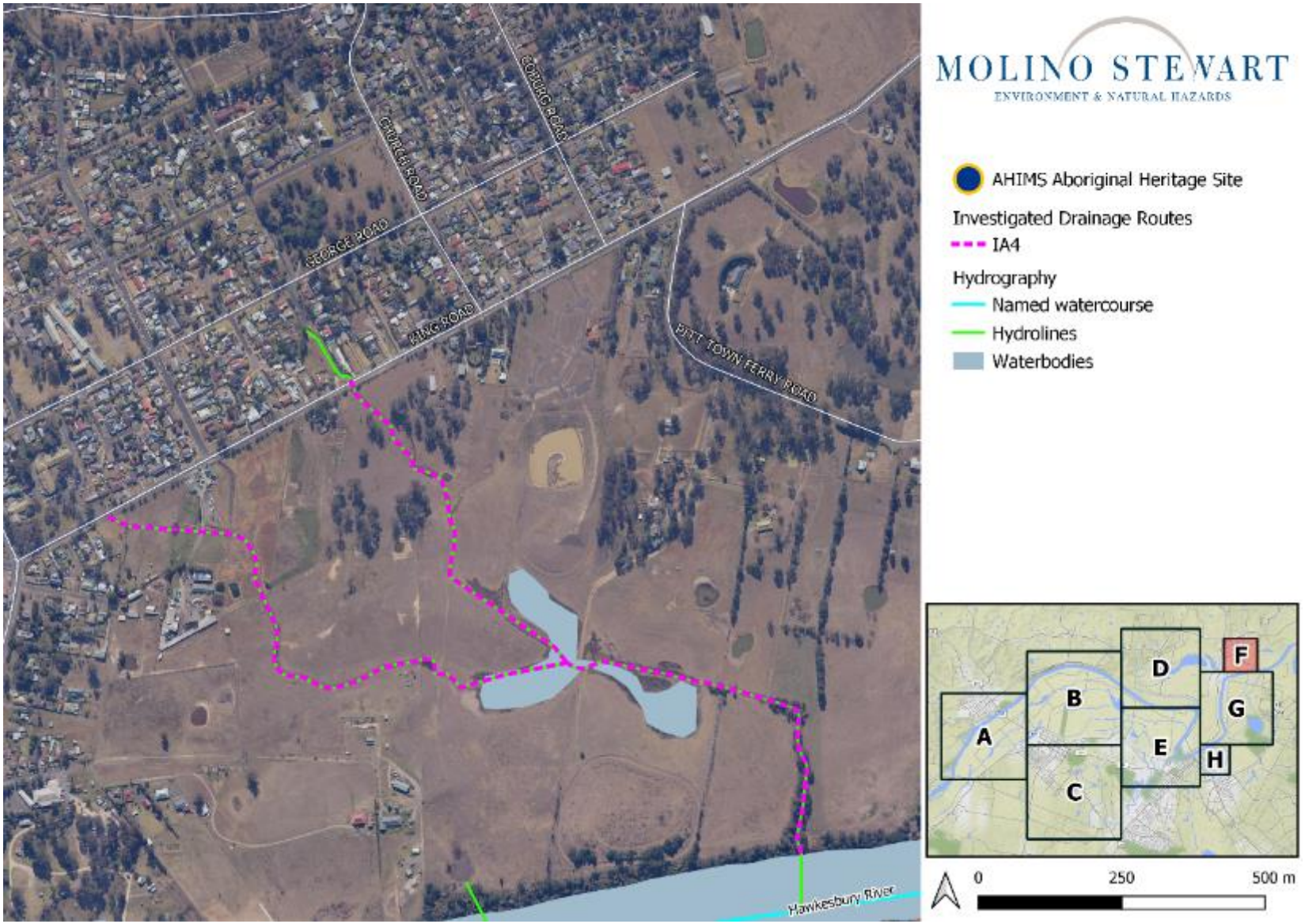


Figure 124: AHIMS Aboriginal Sites (Extent F)

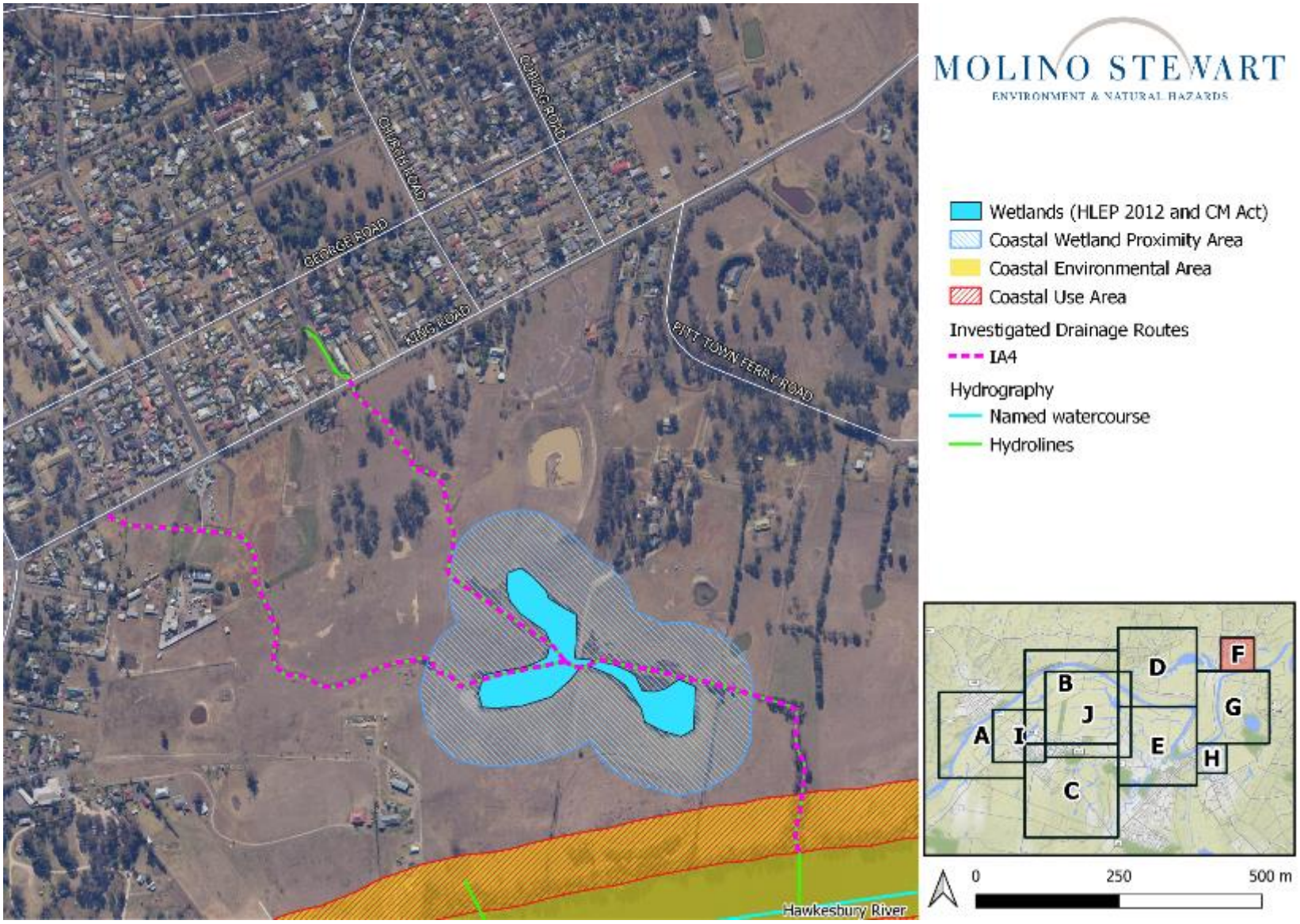


Figure 125: Wetlands and Coastal Management Areas (Extent F)

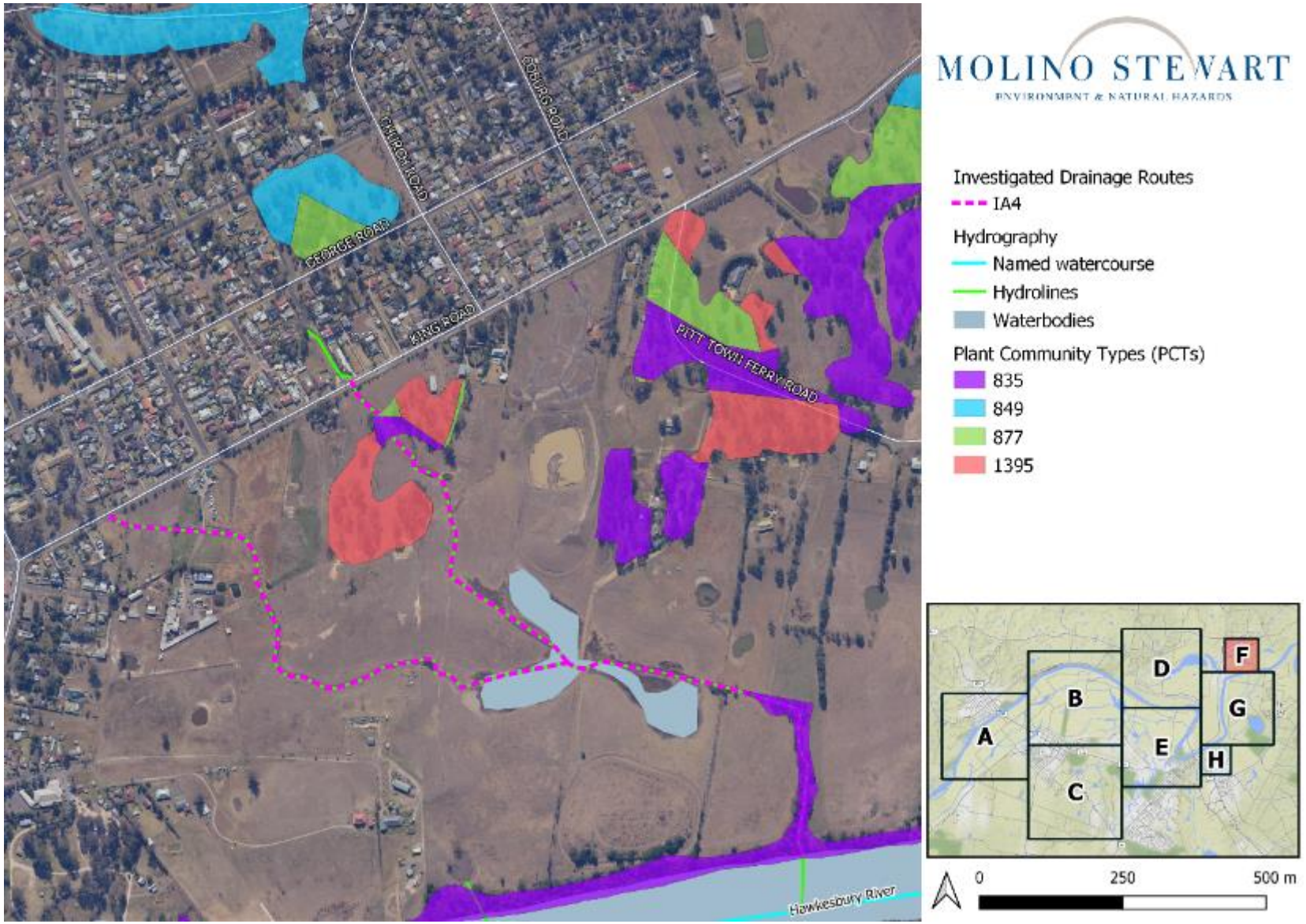


Figure 126: Plant Community Types (Extent F)

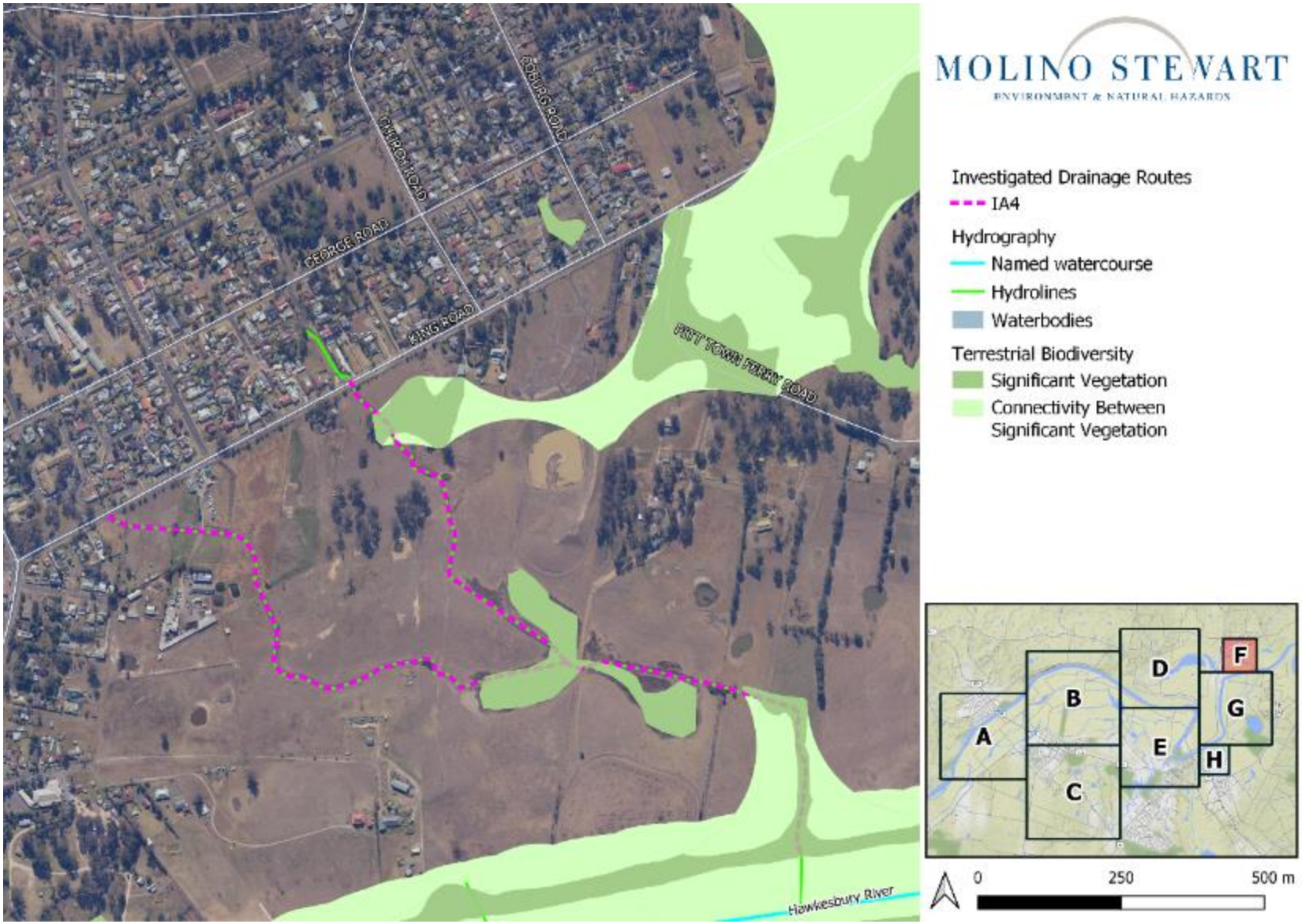


Figure 127: Terrestrial Biodiversity (Extent F)

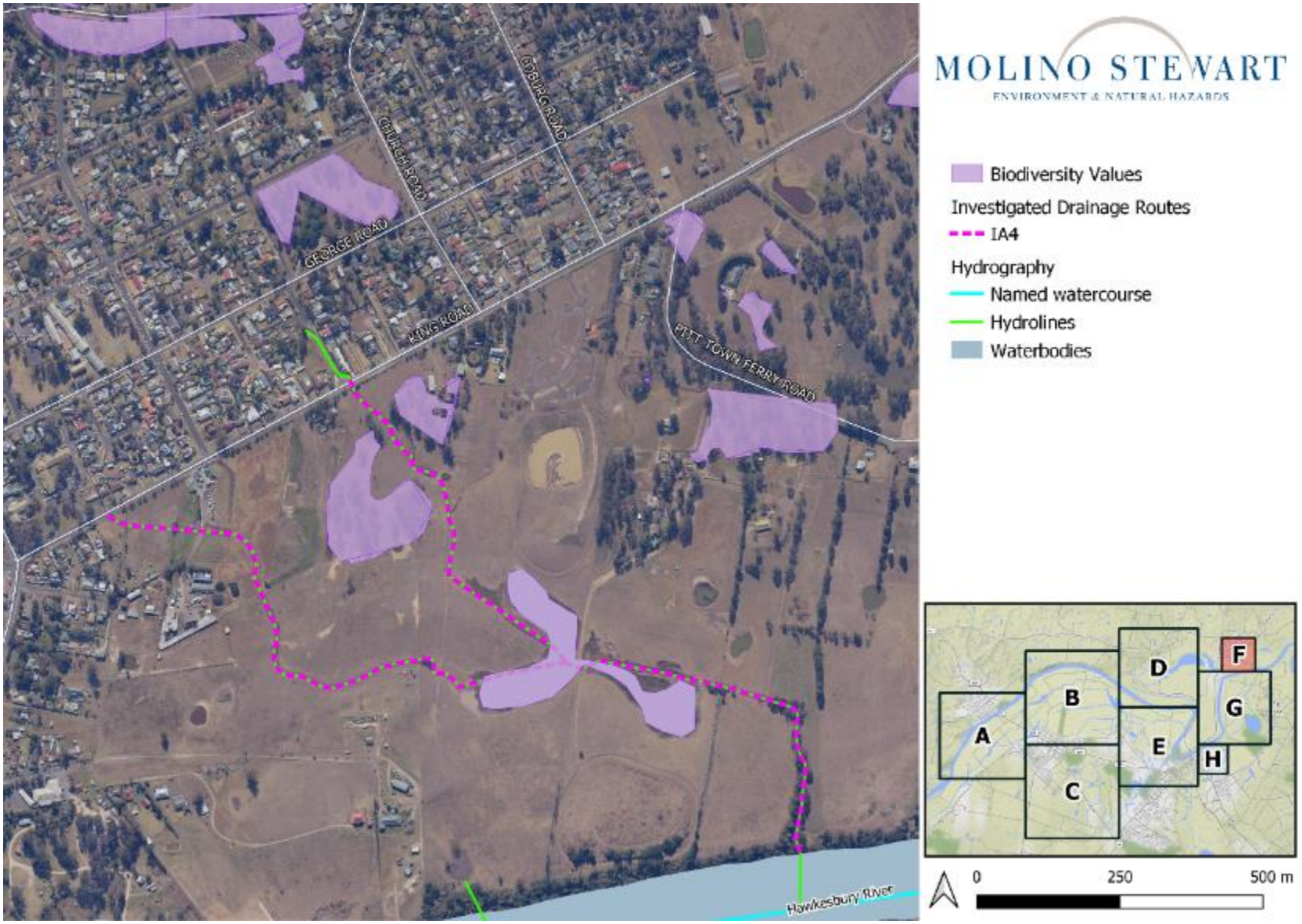


Figure 128: Biodiversity Values (Extent F)

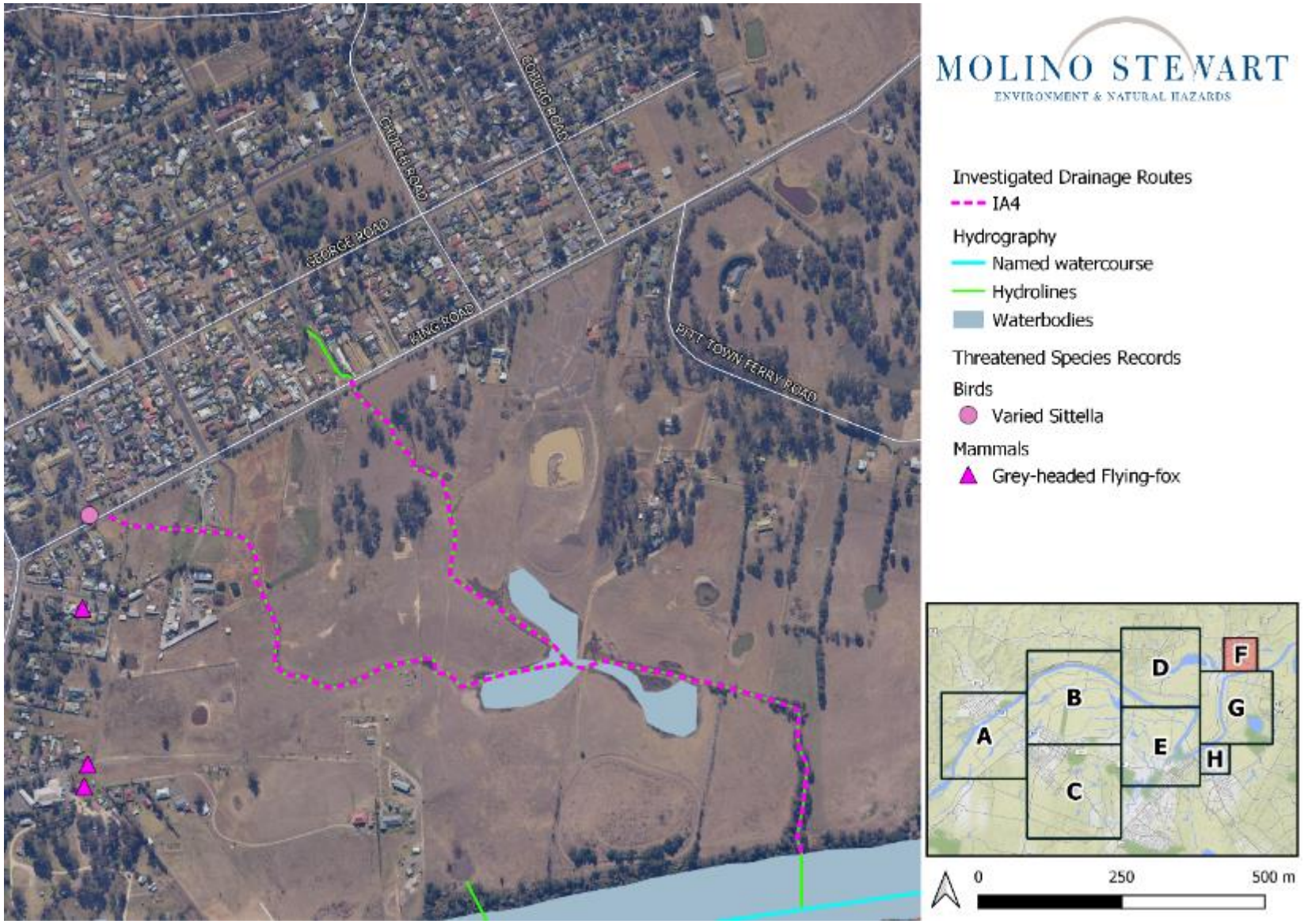


Figure 129: Threatened Species Records (Extent F)

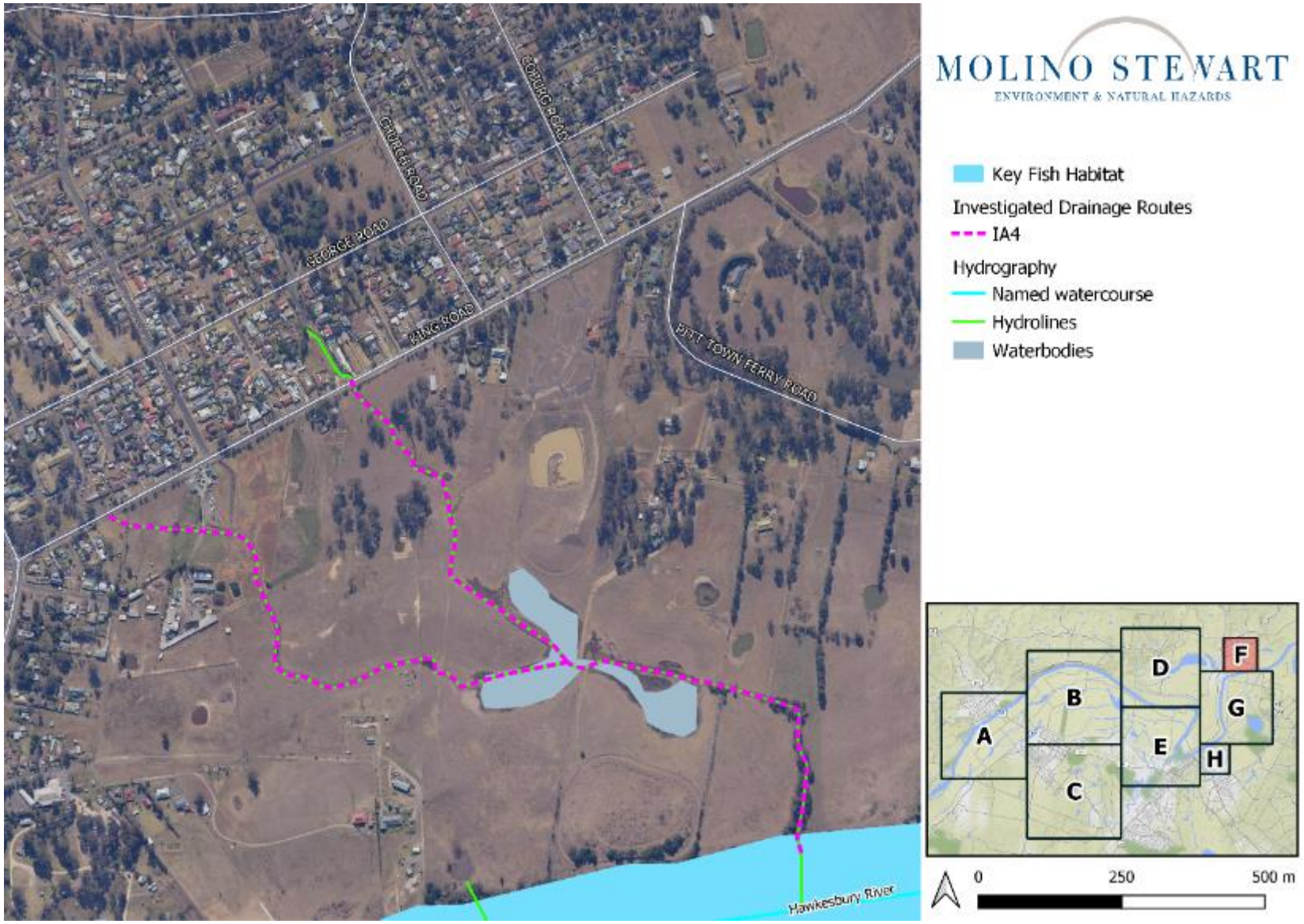


Figure 130: Key Fish Habitat (Extent F)

14| Investigation Area 5

14.1 Drainage Issues

There are two distinct parts to IA5. The northern part, IA5N, drains into an unnamed creek which flows northward directly into the Hawkesbury River. IA5S, the southern part of the investigation area, drains into Pitt Town Lagoon which discharges through Bardenarang Gully which flows north into the Hawkesbury River (Figure 131).

Pitt Town Lagoon, Bardenarang Gully and some of the areas draining into them were the subject of a Molino Stewart report prepared for Lynwood Country Club following the 2020 flood. It would appear that some of the recommendations of that report to improve the rate of drainage from the floodplain into Bardenarang Gully have been implemented. Therefore, this report does not focus on the levees and the floodgated pipes through them which are spaced along Bardenarang Gully. Rather it focussed on IA5N and the drainage infrastructure in IA5S which drains east into Pitt Town Lagoon.

The locations of each photograph referred to in the text can be found in Figure 132.

14.1.1 Field observations

a) IA5N

IA5N begins as a shallow drain between turf fields (Photo 358) which wends its way in a generally northward direction. There are a couple of piped crossings and the drain is partly silted (Photo 359) but there are no noticeable obstructions to flow across the floodplain or into the drain. The further north it travels the deeper it becomes (Photo 360). It passes through a pipe under another access road (Photo 361) adjacent to a large shed but its flow north, as marked on the topographic maps, is blocked by an earth embankment (Photo 362).

Instead, at this point it turns at 90 degrees and heads east (Photo 363) to Bardenarang Gully into which it discharges through an embankment with pipes at three levels (Photo 364). The pipe outlets are fitted with flood gates (Photo 365). The embankment and pipes appear to be recently installed and this may have been done in response to recommendations in the 2020 Molino Stewart report to Lynwood Country Club.

The former creek line to the north is overgrown (Photo 366) and was unable to be followed. It was next observed upstream of Pitt Town Bottoms Road (Photo 367) under which it crosses via two pipes with flood gates (Photo 368), one of which has become detached and the proper functioning of the other appears to be inhibited by sediment and debris. Moving downstream the creek is heavily infested with weeds, particularly privet. There are scattered native trees along the banks (Photo 369) and also woody debris within the creek (Photo 370).

There was no evidence that drainage of the surrounding areas had been significantly inhibited by any of the sediment, vegetation or debris within either stretch of the creek.

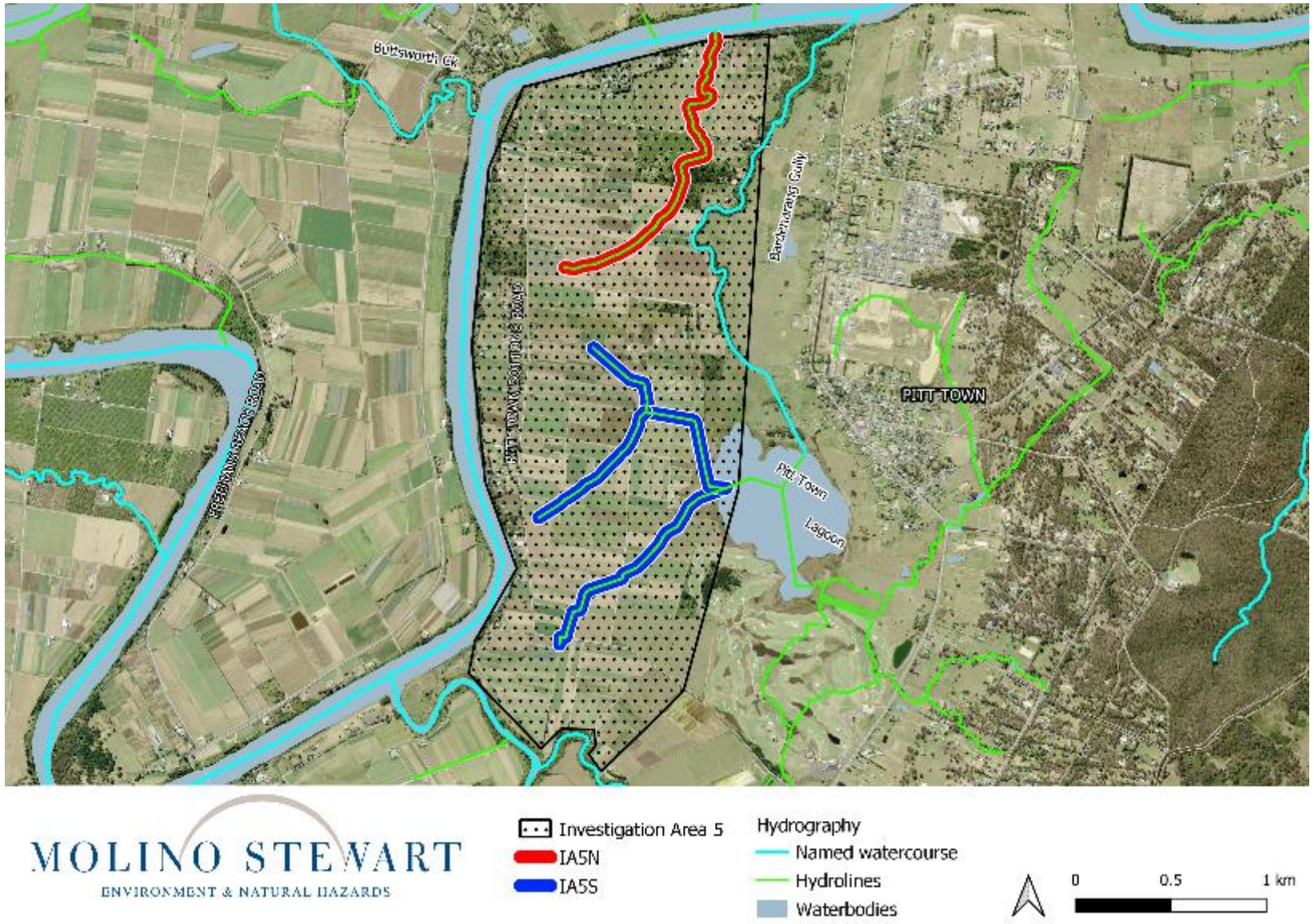


Figure 131: Investigation Area 5 Northern and Southern Drainage Routes (IA5N and IA5S)

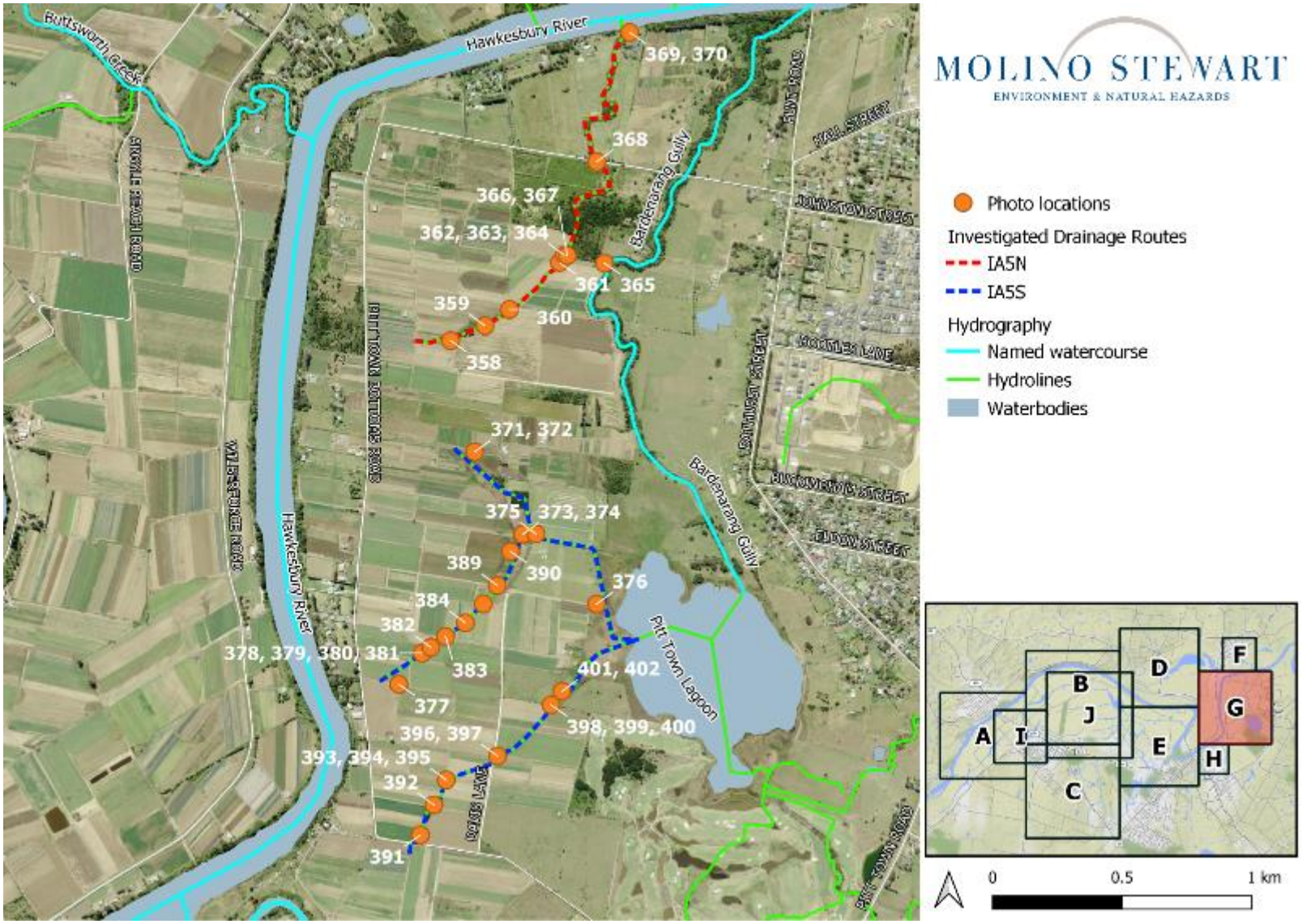


Figure 132: Photo locations for IA5

Photo 358

Photo 359

Photo 360

Photo 361

Photo 362

Photo 363

Photo 364

Photo 365

Photo 366

Photo 367

Photo 368

Photo 369

Photo 370

a) IA5S

The part of IA5S which was the subject of this investigation has three branches, the northern most of which starts as a shallow dish drain through market gardens (Photo 371) before passing via a pipe under an access road into a reed bed (Photo 372). Property owners in this area complained that the last of the water takes a long time to drain and fills up again after rain without being flooded by the river.

The water flows out of the reedbeds about 400m downstream where it passes through a pipe under the access road to the model airplane club grounds (Photo 373). From there it flows east in an open channel (Photo 374) to Pitt Town Lagoon. Adjacent paddocks to the north of the open drain and east of the reed beds to not appear to be able to drain to either (Photo 375).

Pitt Town Lagoon was full at the time with water extending beyond its fringing reed beds and onto the model airplane fields (Photo 376).

The middle branch starts as a channel between a raised access road embankment and a paddock (Photo 377) before turning left and following the paddock and access road boundary (Photo 378) before passing under the road in a pipe (Photo 379). As the ground flattens out here the drain becomes wide and shallow and is heavily silted (Photo 380). There are a number of piped crossings along this stretch for travelling irrigators to cross the drain but the pipes are either partially or full blocked with silt (Photo 381 and Photo 382).

After a piped crossing of an access road embankment (Photo 383), the channel is deeper before coming to an area where it appears that the levels on the paddocks are being reworked, the channel is being widened and there this is a piped access (Photo 384). Note the algae growing to the left of the pipe which suggests that this area may have been waterlogged for quite some time following the recession of the flood.

There is another drain entering from the west at this point (Photo 385) which runs directly from Pitt Town Bottoms Road where it is deeply eroded (Photo 386). Water is ponding in the channel downstream of this junction through to a pipe under and access road (Photo 387) but there was some flow. Downstream of this point the channel has been recently re-excavated (Photo 388). There appears to have also been some sediment removal from the channel downstream of the next pipe crossing (Photo 389) but the channel is silted up further downstream as it enters the reed beds (Photo 390). Within the reed beds the channel appears to be clearer but there is little flow before it joins the drainage channel running along the southern side of the access road to the model airplane field.

The southern branch starts as drainage ditches on either side of the southern part of Pitt Town Bottoms Road which runs east west. It then flows via a poorly defined depression in the fields towards a copse of vegetation (Photo 391) where water can pond then overflow under an access track via some small pipes which are partially blocked (Photo 392). Most probably most of the water flows over the access track.

It then skirts around turf fields in well-defined drains (Photo 393) and piped under access roads as required (Photo 394). Along the way it is fed by drains which border other paddocks and access tracks (Photo 395). After crossing Davis Lane the drain becomes considerably wider but is silted up in places (Photo 396) and not all crossings are piped and not all paddocks flow into the drain (Photo 397).

There is a fence line along a raised embankment under which the drain passes through a 600mm pipe (Photo 398 and Photo 399)). It is clear that water has been ponding in the paddock upstream of this pipe for a considerable time and the grass has died (Photo 399 and Photo 400).

On the other side of the embankment the channel start to flow through reed beds with considerable reworking of silt deposits (Photo 401). It flows into an area of standing open water (Photo 402) which discharges through a channel whose surface is covered in aquatic weeds. From here it flows into the reed beds surrounding Pitt Town Lagoon.